



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Timothy J. Hoffman, et al.

Serial No. 09/847,134

Group Art Unit: 1616

Filed: 05/02/01

Examiner: JONES, Dameron Levest

For: GASTRIN RECEPTOR-AVID PEPTIDE CONJUGATES

Attorney Docket No: 0994.00131

COMMUNICATION

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Enclosed herewith is a copy of a thesis of Ning Li. Also enclosed herewith are declarations pertaining to the Ning Li thesis. The declarations detail the manner in which the dissertation occurred. Specifically, the declarations provide confirmation that the dissertation was confidential and was not therefore, a publication of the information detailed in the thesis. Therefore, the thesis is not considered to be prior art. We would appreciate the Examiner reviewing the declarations and entering the declarations into the file history of the application.

In view of the attached declarations and foregoing remarks, reconsideration of the rejections and advancement of the case to issue are respectfully requested.

The Commissioner is authorized to charge any fee or credit any overpayment in connection with this communication to our Deposit Account No. 11-1449.

Respectfully submitted,

KOHN & ASSOCIATES, PLLC



Amy E. Binaldo
Registration No. 45,791
30500 Northwestern Highway
Suite 410
Farmington Hills, Michigan 48334
(248) 539-5050

Dated: December 17, 2003

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" addressed to Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 17, 2003.


Connie Herty



**DECLARATION OF JERRI R. ELDRIDGE RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, Jerri R. Eldridge, do hereby declare the following:

1. I am an Information Specialist II at the University of Missouri-Columbia Library. My address is 4916 Brown Station Road #43, Columbia, Missouri 65202. I have been employed by the University of Missouri since 1990.

2. At the request of Wynn A. Volkert, I have reviewed the Library records and, based on those records, advised Dr. Volkert that the Doctoral Dissertation of NING LI titled "Synthesis and Characterization of ¹⁰⁵Rh-Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", was sent from the University Library to UMI Company for microfilming on May 19, 1999, and that it was processed by UMI Company on June 20, 1999.

3. It is standard practice and procedure of the University Library to coordinate publication of Doctoral Dissertations once received from the Graduate School of the University of Missouri-Columbia.

4. To the best of my knowledge, based on the records of the University Library, and standard procedures of the Library, the NING LI Doctoral Dissertation was not available to the public from the time it was received by the Library until it was sent to UMI Company on May 19, 1999.

5. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

**DECLARATION OF JERRI R. ELDRIDGE RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

August 22, 2003
Date

Jerri R Eldridge
Jerri R. Eldridge

COUNTY OF Boone)
) ss:
STATE OF MISSOURI)
)
UNITED STATES OF AMERICA)

On this 22 day of August, 2003, before me, a Notary Public, personally appeared Jerri R. Eldridge to me known to be the person described in and who executed the foregoing assignment and acknowledged that he executed same as his free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal the date and year last above written.

Judith A. Tayloe
Notary Public

My Commission Expires: 1/22/06

(SEAL)

JUDITH A. TAYLOE
Notary Public - Notary Seal
STATE OF MISSOURI
Howard County
My Commission Expires: Jan 22, 2006

**DECLARATION OF LINNIE L. LAWSON RELATING TO DISCLOSURE OF DISSERTATION
OF NING LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, Linnie L. Lawson, do hereby declare the following:

1. I am an Academic Advisor (retired) at the University of Missouri-Columbia. My address is P.O. Box 61, Centralia, Missouri 65240. I have been employed by the University of Missouri since 1985 until August 2000, when I retired. I now work part-time for the University.
2. It is the normal procedure of the Graduate School to receive and to be the depository for Doctoral Dissertations submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy, prior to the release of the Dissertation to the University Library.
3. I have reviewed the Graduate School records and, based on those records, note the Doctoral Dissertation of NING LI titled "Synthesis and Characterization of ¹⁰⁵Rh-Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", was received by the Graduate School prior to August 2, 1996.
4. The records of the Graduate School also indicate that Dr. Wynn Volkert requested on January 6, 1997, that the Doctoral Dissertation of NING LI not be released to the University Library or be made publicly available until further instructions were received from Dr. Volkert.
5. The Graduate School, as a matter of standard procedure, does not make dissertations available to the public without a memorandum requesting such from the dissertation advisor. I have found no such memorandum in the files of the Graduate School requesting a release of the NING LI Dissertation to the public.
6. To the best of my knowledge, based on the records of the Graduate School, and standard procedures of the Graduate School, the NING LI Doctoral Dissertation was not made available to the

**DECLARATION OF (STAFF OF GRADUATE SCHOOL) RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

public between the time it was received by the Graduate School (prior to August 2, 1996) and January 6, 1997.

7. The Graduate School records indicate that Dr. Volkert authorized release of the NING LI Dissertation from the Graduate School to the University Library on March 2, 1999.

8. To the best of my knowledge, based on the records of the Graduate School, and standard procedures of the Graduate School, the NING LI Doctoral Dissertation was not made available to the public between January 6, 1997 and March 2, 1999, when it was released from the Graduate School to the University Library.

9. I am not aware of any copies of the NING LI Doctoral Dissertation which were provided to anyone while in the custody of the Graduate School.

10. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Sept 12, 2003
Date

Janice L. Lawson
(Name)

**DECLARATION OF (STAFF OF GRADUATE SCHOOL) RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

COUNTY OF Boone)
) ss:
STATE OF MISSOURI)
)
UNITED STATES OF AMERICA)

On this 12th day of September, 2003, before me, a Notary Public, personally appeared (name) Linnie L. Lawler to me known to be the person described in and who executed the foregoing assignment and acknowledged that he executed same as his free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal the date and year last above.
JUDITH A. TAYLOR
written. Notary Public - Notary Seal
STATE OF MISSOURI
Howard County
My Commission Expires: Jan 22, 2006
My Commission Expires: 1/22/06

Judith A. Tayloe
Notary Public

(SEAL)

**DECLARATION OF NING LI RELATING TO DISCLOSURE OF DISSERTATION OF NING
LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, Ning Li, do hereby declare the following:

1. I am a Senior Research Scientist at Pfizer, Inc. in Chesterfield, Missouri. My address is 108 Birchwood Trail Drive, Maryland Heights, Missouri 63043. I have been with Pfizer, Inc. (formerly Pharmacia Corporation, formerly Monsanto Company) since 2000. A copy of my professional resume is attached.
2. I authored and defended a Doctoral Dissertation titled "Synthesis and Characterization of ¹⁰⁵Rh-Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.
3. I am a co-inventor of the subject matter disclosed in the above-identified patent applications as well as the parent U.S. Provisional Application No. 60/044,409, which was filed April 22, 1997.
4. I am a co-author of the Abstract presented at the 43rd Annual Meeting of the Society of Nuclear Medicine and published in Vol 37, No. 5, in the May 1996 Supplement of the Journal of Nuclear Medicine. The title of this Abstract is "In-Vitro and In-Vivo Characterization of a Rh-105-Tetrathiamacrocyclic Conjugate of a Bombesin Analogue."
5. I have been requested to prepare and execute the present Declaration to memorialize my current recollection as to the manner in which the oral Dissertation defense and written text of my Doctoral Dissertation were handled until immediately after April 22, 1997, i.e., the filing date of U.S. Provisional Application 60/044,409.
6. I defended the Doctoral Dissertation during an oral proceeding on July 24, 1996. The following persons, who served on the Dissertation committee were also present: Dr. Wynn A. Volkert,

**DECLARATION NING LI RELATING TO DISCLOSURE OF DISSERTATION OF NING LI,
Ph.D.**

Professor of Radiological Sciences and Biochemistry; Dr. Silvia S. Jurisson, Professor of Chemistry; Dr. Thomas P. Quinn, Associate Professor of Biochemistry; Dr. John F. Kauffman, Associate Professor of Chemistry; and Dr. Kattesh V. Katti, Professor of Radiology. To the best of my current recollection, we were the only persons present during the Dissertation defense.

7. The Doctoral Dissertation was not open to the general public.

8. Except as described in ¶4 above, prior to the April 22, 1997 filing date of U.S. Provisional Patent Application No. 60/044,409 I did not reveal the details of the oral presentation and written text of the Doctoral Dissertation to any third parties outside the University of Missouri who did not have an obligation of confidentiality.

9. I am not aware of any copies of the Doctoral Dissertation which were provided to anyone other than the following persons, who were the members of the Dissertation Committee: Volkert, Jurisson, Quinn, Kauffman, Katti (as described in ¶6). To my recollection these copies were collected by me at the end of the Dissertation defense. To the best of my current recollection, I destroyed these copies after incorporating into the final draft of my Dissertation the comments made on those copies by the Dissertation Committee members.

10. To the best of my current recollection, I filed the Doctoral Dissertation with the Graduate School of the University of Missouri-Columbia, as required in partial fulfillment of the requirements for the Degree of Doctor of Philosophy, approximately one week after completing the oral defense described in ¶6 above.

11. To the best of my knowledge, the details of the oral Dissertation defense and written text of the Doctoral Dissertation, beyond the details disclosed in the Abstract described in ¶4 above, were not disclosed to any third parties outside the University of Missouri who did not have an obligation of confidentiality, until after April 22, 1997, the filing date of U.S. Provisional Patent Application No. 60/044,409.

12. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or

**DECLARATION NING LI RELATING TO DISCLOSURE OF DISSERTATION OF NING LI,
Ph.D.**

imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

09/06/03
Date

-Ning Li
Ning Li

COUNTY OF St. Louis)
STATE OF MISSOURI) ss:
UNITED STATES OF AMERICA)

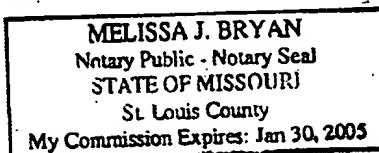
On this 6 day of September, 2003, before me, a Notary Public, personally appeared Ning Li to me known to be a person described in and who executed the foregoing Declaration and acknowledged that he executed same as his free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal the date and year last above written.

Melissa J. Bryan
Notary Public

My Commission Expires: Jan 30, 2005

(SEAL)



Ning Li
108 Birchwood Trail Dr.
Maryland Heights, MO 63043
(314) 289-8912 (Home)
(636) 247-6359 (Office)

EXPERIENCE

Senior Research Scientist

Apr. 2003- Present

Pfizer Inc. Global Research & Development, Protein Pharmaceuticals

- Design and carries out research to develop parenteral dosage forms on mAb. Implements activities after review by supervisor for technical merit.
- Designs and conducts studies in support of PA candidate selection and pre-formulation for protein compounds.
- Maintains scientific activity at state-of-the-art level. Incorporates scientific methodology into individual activities.
- Prepares and obtains approval for technical reports documenting development activities. Assists in preparation of IND, NDA, and other documents on assigned projects as needed.
- Is fully familiar with policies related to GMPs, safety, and department procedures.
- Is familiar with the operation and maintenance of equipment employed for formulation development activities.
- Provides input into selection, justification, purchase, and installation of new equipment.
- Interacts as needed with interfacing personnel on projects.
- Handles additional assignments as necessary in order to meet group and departmental goals and objectives.

Research Scientist

Apr. 2001- January 2003

Pharmacia, Bioprocess and Formulation Technologies, Protein Pharmaceuticals Group

- Cation exchange HPLC method development to assess the charge related impurities present in Pegylated Fab
- Capillary isoelectric focusing method development to assess the charge related impurities present in Pegylated Fab
- Investigation of isomer impacts on binding affinity using isothermal titration (ITC) techniques
- Investigation of deamidation of Fab in the production process using cation exchange HPLC, gel IEF and cIEF techniques
- Investigation of color developed in phase II clinical material using free solution capillary electrophoresis technique
- Optimization of formulation matrices for phase III trial using multiple analytical techniques
- Conducting the formulation stability studies following the ICH guidelines

Research Scientist

Jan. 2000- March 2001

Monsanto, Integrated Protein Technologies

- Protein A affinity chromatographic method development to assess the quantity and quality of therapeutic monoclonal antibody (mAb) expressed in transgenic plant
- Cation and anion exchange chromatographic method development to look for the correlation of mAb between the IEF and chromatography
- Size exclusion chromatographic method development to determine the quality and quantity of therapeutic mAb in bulk protein solution
- SDS-PAGE method development to analyze the integrity of therapeutic mAb and impurity in bulk protein solution
- Isoelectric focusing gel electrophoresis method development to determine the PI of therapeutic mAb (this information is used by the purification process development group as input to determine what ion chromatographic method can be used to polish the final product)
- Western Blot method development to analyze the transgenic plant host cell protein
- Purification of polyclonal antibody produced in goat using self prepared ROCP column (Recombinant Host Cell Protein conjugated to agarose media and packed to a column which purify specific antibody from animal serum produced by inoculating the animal with ROCP)
- ELISA method development to determine the ROCP as contaminant in bulk therapeutic mAb solution
- Analysis of plant DNA as contaminant in in-process and final bulk mAb solution

Postdoctoral Associate (agency)

Aug. 1999-Jan. 2000

Monsanto, G.D. Searle Co.

- Developed an in-process anion exchange chromatographic method to analyze the deamidation product in the production of SC70935
- Wrote a SOP for analysis of deamidation product in the production of SC70935 (SOP 400.400)

Postdoctoral Associate (Agency)

Jul. 1998 -Aug. 1999

Monsanto, Integrated Protein technologies

- Developed tryptic map method to analyze un-cleaved Ala-hGH as impurity after in-vitro enzymatic production of hGH
- Developed a tryptic map method to characterize NT001, a single chain antibody produced in E. Coli.
- Conducted routine Peptide mapping, reversed phase, size exclusion HPLC of hGH for in-process analysis and product release analysis
- Conducted IEF for hGH release analysis and NRX 451 (Therapeutic mAb) stability study.
- Participated large scale production and purification of GP2000 from E. Coli.
- Developed a radiochemistry assay to quantitatively analyze galactosyltransferase expressed in transgenic plant

Postdoctoral Fellow

Mar. 1997 – Jun. 1998

Johns Hopkins University Medical Institutions, USA

- Designed, synthesized, and characterized Bitistatin analogues (25 amino acid) as potential targeting agents for thrombosis imaging

- Conducting routine conjugation, labeling, purification and characterization of Bitistatin (a 83 amino acid peptide produced by recombinant DNA method) with Tc-99m for clinical studies
- Developed a novel reversed phase method to analyze peptide targeting agents and their metabolites in biological matrices

Postdoctoral Fellow

Sep. 1996 - Feb. 1997

Department of Chemistry, University of Missouri, USA

- Conducted routine peptide synthesis, characterization, and purification.
- Developed a novel HPLC method to analyze Tc-99m labeled peptide and their metabolites in biological matrices

Research Assistant

Aug. 1992 - Aug. 1996

Department of Chemistry, University of Missouri - Columbia, USA

- Developed a novel method to conjugate bifunctional chelating agents [14]aneNS₃, [16]aneS₄ to GRP (Gastrin Releasing Peptide) receptor agents as potential cancer therapeutic agent
- Established HPLC protocol to identify the peptides and their metabolites in biological matrices and different cancer cell lines
- Conducted routine GRP related peptide synthesis
- Conducted routine in-vitro cell binding assays to measure the binding affinity of radio-labeled peptide

Research Specialist

Jan. 1992 - Aug. 1992

School of Pharmacy, University of Missouri - Kansas City, USA

- Optimized HPLC method to purify Substance-P receptor agents
- Conducted routine receptor binding assay (tissue culture) to correlate the degree of pain and Substance-P accumulation in animal

Research Assistant

Aug. 1988 - Dec. 1991

Department of Chemistry, University of Kansas - Lawrence, USA

- Developed a novel procedure for synthesis of porphyrin-like macrocycles, which accommodate two metal ions to mimic biological catalysis process of redox reaction.
- Developed GC method to monitor the redox reaction and quantitate the product yield.
- Developed a NMR method to monitor the specificity of catalytic reaction
- Developed a Cyclic Voltammetric method to determine the mechanism of redox reaction.

Research Associate

Aug. 1982 - Dec. 1987

*Chemical Engineering Department,
Beijing Institute of Light Industry, Beijing, P.R. China*

- Developed HPLC and GC methods for identification of key impurities in food preserver
- Modified HPLC method to identify the key impurities in fragrance

EDUCATION

Ph.D., Chemistry, Aug., 1996.

Department of Chemistry, University of Missouri - Columbia, USA

MS., Chemistry, 1991.

Department of Chemistry, University of Kansas - Lawrence, USA

BS., Chemistry, 1982.

Department of Chemistry, Peking University, Beijing, P.R. China.

**DECLARATION OF WYNN A. VOLKERT RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, Wynn A. Volkert, do hereby declare the following:

1. I am a Professor of Radiological Sciences and Biochemistry at the University of Missouri-Columbia. My address is 2808 Butternut Court, Columbia, Missouri 65201. I have been a professorially-ranked employee of the University of Missouri since 1967. A copy of my professional resume is attached.

2. I was NING LI's Dissertation Supervisor and directed NING LI's research which is reported in NING LI's Doctoral Dissertation titled "Synthesis and Characterization of ¹⁰⁵Rh-Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", which was prepared and presented in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

3. I am a co-inventor of the subject matter disclosed in the above-identified patent applications as well as the parent U.S. Provisional Application No. 60/044,409, which was filed April 22, 1997.

4. I am a co-author of the Abstract presented at the 43rd Annual Meeting of the Society of Nuclear Medicine and published in Vol 37, No. 5, in the May 1996 Supplement of the Journal of Nuclear Medicine. The title of this Abstract is "In-Vitro and In-Vivo Characterization of a Rh-105-Tetrathiamacrocycle Conjugate of a Bombesin Analogue."

5. I have been requested to prepare and execute the present Declaration to memorialize my current recollection as to the manner in which the oral Dissertation defense and written text of the

**DECLARATION OF WYNN A. VOLKERT RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

Doctoral Dissertation of NING LI were handled until immediately after April 22, 1997, i.e., the filing date of U.S. Provisional Application 60/044,409.

6. I was present at the Doctoral Dissertation defense of NING LI on July 24, 1996. The following persons, who served on the Dissertation committee were also present: Dr. Silvia S. Jurisson, Professor of Chemistry; Dr. Thomas P. Quinn, Associate Professor of Biochemistry; Dr. John F. Kauffman, Associate Professor of Chemistry; and Dr. Kattesh V. Katti, Professor of Radiology. To the best of my current recollection, we were the only persons present during the Dissertation defense.

7. The Doctoral Dissertation defense of NING LI was not open to the general public.

8. Except as described in ¶4 above, prior to the April 22, 1997 filing date of U.S. Provisional Patent Application No. 60/044,409 I did not reveal the details of the oral presentation and written text of the Doctoral Dissertation defense of NING LI to any third parties outside the University of Missouri who did not have an obligation of confidentiality.

9. On January 6, 1997, I requested of the Graduate School of the University of Missouri-Columbia that the Doctoral Dissertation of NING LI not be released for publication or for public access. At the time of my request I informed the Graduate School I would let it know when the Dissertation could be released. I authorized this release on March 2, 1999. I have been informed by Ms. Jerri R. Eldridge of the University of Missouri-Columbia Library that the Dissertation was sent to UMI Company for microfilming on May 19, 1999, and that it was processed by UMI Company on June 20, 1999.

10. I am not aware of any copies of the Doctoral Dissertation which were provided to anyone other than the following persons, who were the members of the Dissertation Committee: Volkert, Jurisson, Quinn, Kauffman, Katti (as described in ¶6). To my recollection these copies were collected by NING LI at the end of the Dissertation defense. Upon my recent inquiry of NING LI regarding the fate of these copies, NING LI confirmed that to the best of her current recollection, she destroyed these copies after incorporating into the final draft of her Dissertation the comments made on those copies by the Dissertation Committee members.

11. To the best of my knowledge, the details of the oral Dissertation defense and written text of the Doctoral Dissertation, beyond the details disclosed in the Abstract described in ¶4 above, were not

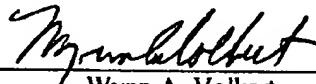
**DECLARATION OF WYNN A. VOLKERT RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

disclosed to any third parties outside the University of Missouri who did not have an obligation of confidentiality, until after April 22, 1997, the filing date of U.S. Provisional Patent Application No. 60/044,409.

12. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

9/3/03

Date


Wynn A. Volkert

WYNN ARTHUR VOLKERT, Ph.D.

Curriculum Vitae

EDUCATION: St. Louis University, B. S. (Chemistry) 1963
University of Missouri, Ph.D. (Physical Chemistry) 1968

ACADEMIC APPOINTMENTS:

Interim Director, Nuclear Science and Engineering Institute, 2001- present

Director, Radiopharmaceutical Sciences Institute, 1999 - present

Curators Professor of Radiological Sciences, Biochemistry, Chemistry,
and Nuclear Engineering, University of Missouri, Columbia, Missouri,
September 1, 2000-present

Professor of Radiological Sciences, Biochemistry, Chemistry, and Nuclear
Engineering, University of Missouri, Columbia, Missouri, 1981-present

Senior Research Career Scientist, H.S. Truman Memorial Veterans Hospital,
Columbia, MO April 1, 1999 - 2001

Associate Research Career Scientist, Veterans Administration Research Division, H.S.
Truman Memorial Veterans Hospital, Columbia, MO 1988-1998

Visiting Research Professor, Division of Radiopharmacy, Paul Scherrer Institute,
Villigen, Switzerland, January 15 - August 30, 1997 Research Leave with Professor
P.A. Schubiger, ETH-Zurich (Swiss Confederation Institute of Technology)

Visiting Research Professor in Radiopharmaceutical Chemistry, George Washington
University, Washington, D. C., March 1 - August 31, 1981 Research Leave with
Professor W. Eckelman

Doctoral and Graduate Faculty Member, University of Missouri, Columbia, Missouri,
1976-present

Associate Professor of Radiological Sciences & Biochemistry, University of Missouri,
Columbia, Missouri, 1973-1981

Associate Investigator, Dalton Research Center, University of Missouri, Columbia,
Missouri, 1969-1981

Assistant Professor of Radiological Sciences, University of Missouri, Columbia,
Missouri, 1969-1973

Research Associate in Physiology, NASA Postdoctoral Fellow University of Missouri,
Columbia, Missouri, 1967-1969

ADMINISTRATIVE APPOINTMENTS:

Director of Radiopharmaceutical Sciences Institute, February 1999-present

Director, Radiological Sciences Section Department of Radiology, University of Missouri-Columbia, September 1984-present

Chairman of Board, Missouri Foundation for Medical Research, H.S. Truman Memorial Hospital, 1991-present

Interim Chairman, Department of Radiology, University of Missouri-Columbia
4/1/87-8/1/87

Director, Nuclear Medicine Technology Educational Program, University of Missouri-Columbia, 1976-1984

DEPARTMENT OF VETERANS AFFAIRS (DVA) SERVICE:

National

Program Specialist in Radiology and Nuclear Medicine, Medical Research Division, DVA Health Services and Research Administration, 1990-1996.

Reviewer for Merit Review proposals, Medical Research Division, DVA

H.S. Truman Memorial VAMC

Research and Development Committee, 1988-93 and 1998-2001, Chair, 1990-93

Research Space Committee, 1990-1993 and 1997-present, Chairman, 1990-1993

Coordinating Committee for Core Immunology and Cell Culture Facility, 1990-1993

Board of Directors, Missouri Foundation for Medical Research (not-for-profit foundation at VAMC), 1991-present; Chairman of Board, 1991-present.

MEMBERSHIP IN NATIONAL PROFESSIONAL ORGANIZATIONS:

Society of Nuclear Medicine; Member 1974-present

House of Delegates (Radiopharm. Council Delegate) 2001

Board of Trustees 1987-1989, 1993-1996

Government Relations Committee; 1996-present

Radiotherapy Council, 1992-present

Isotope Availability Committee, 1990-1998; Chairman 1991-1998

Commission on Radiopharmaceuticals, 1995-2001

Commission on Scientific Affairs and Research, 1995-1997

Nominating Committee 1987-1989

Ad Hoc Committee on Council Coordination 1986-1988

Credentials and Membership Committee 1986-1988

Pharmacopeia Committee 1989-present

Scientific Reviewer and Sub-Program Chairman for Annual SNM Meeting (5 years)

Missouri Valley Chapter - SNM; Member 1974-Present

Board of Directors 1980-1991

Ann. Mtg. Scientific Prog. Chairman 1974, 1981 and 1986

President-Elect 1985-1987

President 1987-1989
 Sigma Xi; Member 1968-present; MU Chapter President 1988-1989,
 Vice President 1987-1988; Secretary Treasurer, 1985-1987
 American Chemical Society; 1963-present
 Biophysical Society; 1972-present
 International Association of Radiopharmacology; 1989-present
 Radiation Research Society; 1968-present
 Radiopharmaceutical Science Council (USA); Member 1976-present,
 President-Elect 1986-1987; President 1987-1988
 Elected Delegate to SNM House of Delegates, 2001
 Mid-Missouri Sub Chapter - SNM
 Vice-President 1985
 President 1986, 1994
 Oak Ridge Associate Universities
 Visiting Scholars Program, Lecturer 1989-92

HONORS AND POSTDOCTORATE:

Nuclear Medicine and Biology, Editorial Board
 University of Missouri Curator's Professorship, 2000
 University of Missouri Faculty-Alumni Award Recipient, 1992
 Honorary President, ^{99m}Tc-HMPAO Brain Blood Flow Symposium, September 1987,
 Copenhagen, Denmark
 Alpha Chi Sigma, Chemistry Honorary, 1965
 Pi Mu Upsilon, Mathematics Honorary, 1963
 Postdoctorate in Physiology, University of Missouri-Columbia 1967-1969, NASA Fellow
 Who's Who in Missouri Education
 RAD Award (Residents Award for Dedication), Outstanding Teacher, Department of
 Radiology, University of Missouri
 Outstanding Teacher Award, NMT, School of Health Related Professions
 Outstanding Performance Award, Research Service, H.S. Truman Memorial VA Hospital

GRANT AND SCIENTIFIC REVIEW ACTIVITIES:

National Institute of Health
 Diagnostic Radiology Study Section; 1998
 Member, NIH Special Study Section ZRG1-SSS-1(11), July 11-12, 2002
 Invited Participant at NIH Workshop on *In Vivo* Molecular Imaging Center Grant
 Awardees
 Ad Hoc Reviewer and Site Visitor for NIH Individual Grant and Program Project
 Proposals, 1985-present
 Multidisciplinary Sciences Special Emphasis Review Panel, ZRG-7-DMG(4); 1997-98
 Department of Veterans Affairs Health Services and Research Administration, 1990-1996
 Program Specialist in Radiology and Nuclear Medicine, Medical Research Division
 U.S. Dept. of Energy, Review Panel for National Biomedical Tracer Facility 1995
 U.S. Dept. of Energy, Workshop Panel Member on Radiochemistry Research Resources,
 April 2002
 Brookhaven National Laboratory, U.S. Department of Energy, National Advisory Committee
 for Production of Radioisotopes for Biomedical Research, 1996-1998
 Oak Ridge National Laboratory, U.S. Department of Energy, Advisory Committee for the
 Chemical Technology Division, 1966
 Reviewer for DOE Grant Proposals, 1985-present

Reviewer for DVA Merit Review Proposals, 1988-present

Reviewer for NSF Grant Proposals, 1976-1979

Reviewer for PRF Grant Proposals, 1978-1984

Reviewer for several scientific journals (incl. J Nucl Med, Int J Nucl Med Biol,
Int J Appl Radiat Isotopes, and Bioconj. Chem.).

U.S. Department of Energy and Nuclear Engery Institute

New Nuclear Science and Engineering Institute Concept Presentation, January
16-18, 2002, Washington, D.C.

Participant in DOE Workshop on Radiochemistry Research Resources, April 24, 2002,
Chicago, IL

University Nuclear Science and Engineering Program Directors Meeting with
Congressional Delegates, Washington, D.C., June 26-27, 2002

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Volkert, W.A.: Mid-Winter Society of Nuclear Medicine Meeting, participated as member of SNM House of Delegates, Radiopharmaceutical Sciences Council BOD Meeting and SNBM Pharmacopia Committee, Phoenix, AZ, February 9-11, 2002.

Volkert, W.A.: Presented invited talk entitled "Development of radiolabeled ST peptide conjugates for Specific Targeting of Guanylin/guanylate Cyclase-C Receptors Exposed on Colorectal Cells", Los Alamos National Laboratory, Los Alamos National Laboratory, Los Alamos, NM, February 12, 2002.

Volkert, W.A.: Bombesin Radiotracers for Targeting Breast and Prostate Cancers. 2nd Annual Scientific Session, Cancer-Specific Radiopharmaceuticals, April 19, 2002, St. Louis, MO.

Volkert, W.A.: Seventh Ann. Oncology Conference, St. Louis, MO; Program Director, Symposium on Cancer Specific Radiopharmaceuticals and presented invited talk entitled "Bombesin Radiotracers for Targeting Breast and Prostate Cancer", April 19-21, 2002.

Volkert, W.A.: The Nuclear Sciences Institute at the University of Missouri. Missouri River Valley Chapter-AAPM, Osage Beach, MO, May 2002.

Volkert, W.A.: Missouri River Valley Chapter - Am. As soc. Physicists in Medicine. Presented Invited talk entitled "The Nuclear Science and Engineering Institute at the University of Missouri, May 4, 2002.

Volkert, W.A., Gali, H., Sieckman, G.L., Hoffman, T.J., Owen, N.K., Mazuru, D.G., Forte, L.R.: Targeting of human colorectal cancers using a new ¹¹¹In labeled *Escherichia Coli* ST_h analog. 49th Annual Society of Nuclear Medicine Mtg, Los Angeles, CA, June 15-19, 2002.

Volkert, W.A.: Radiolabeled peptide agonists for targeted therapeutic applications. Modern Imaging Technology: Basic Science in Medical Applications Conference, Los Angeles, CA., June 14-15, 2002.

Smith, C.J., Sieckman, G.L., Owen, N.K., Hayes, D.L., Mazuru, D.G., Kannan, R., Volkert, W.A., Hoffman, T.J.: Radiochemical investigations of [^{99m}Tc(H₂O)(CO)₃-DPr-(X)-Bombesin(7-14)NH₂], a new family of GRP-receptor targeting radiopharmaceuticals. Sixth International Symposium on Technetium in Chemistry and Nuclear Medicine, Bressanone, Italy, September 4-7, 2002

Volkert, W.A., Sieckman, G.L., Forte, L.R., Hoffman, T.J., Owen, N.K., Mazuru, D.G.: Selective *in vitro* and *in vivo* targeting of In[111]-DOTA-Phe[19]-ST[h] to human breast cancer cells. 1st Annual Meeting of Society of Molecular Imaging, Boston, MA, August 23-26, 2002, Molecular Imaging 1:222-223, 2002

Hoffman, T.J., Smith, C.J., Owen, N.K., Sieckman, G.L., Foster, B.N., Mazuru, D.,

Volkert, W.A.: Lu-177 radiolabeled peptides for targeted radiotherapy of androgen independent prostate cancer. 94th Annual Mtg., AACR, Toronto, Ontario, Canada, April 5-9, 2003.

Forte, L.R., Giblin, M.F., Sieckman, G., Volkert, W.A.: Identification of a membrane "receptor-like" protein that selectively binds heat-stable enterotoxin (ST_h1-19) but not uroguanylin or guanylin. FASEB Meeting, 2003.

Gali, H., Giblin, M.F., Sieckman, G.L., Owen, N.K., Forte, L.R., Volkert, W.A.: The effect of linker moieties on the targeting of DOTA-ST_h conjugates to human breast cancer cells *in vitro* and *in vivo*. 50th Soc. Nucl. Med. Ann. Mtg., New Orleans, LA, June 21-25, 2003.

Smith, C.J., Sieckman, G.L., Owen, N.K., Atkinson, L.A., Volkert, W.A., Hoffman, T.J.: Design and development of Tc-99m-carbonyl-bombesin analogs: A structure activity relationship study. 50th Soc. Nucl. Med. Ann. Mtg., New Orleans, LA, June 21-25, 2003.

FDA APPLICATIONS PREPARED AND FILED:

Drug Master Files (DMF) Assembled and Written

1. DMF #5077; R. A. Holmes and W. A. Volkert, Tc-99m-Propylene Amine Oxime (Tc-99m-PnAO), September 1983.
2. DMF #5456; R. A. Holmes and W. A. Volkert, Tc-99m-hexamethylpropleneamine oxime (Tc-99m-HM-PAO), April 1985.
3. DMF #6341; R. A. Holmes, W. A. Volkert and G. Ehrhardt, Sm-153-ethylenediamine tetramethylenephosphonic acid (Sm-153-EDTMP), 1987.

Investigational New Drug (IND) Applications for FDA Approved Clinical Trials

IND #21,530; In-111-labeled leukocytes for abscess imaging, May 1984; IND #22,832; Tc-99m-PnAO for cerebral blood flow imaging, September 1983; IND #26,282; Tc-99m-HM-PAO for cerebral blood flow studies, April 1985; IND #27,865; Sm-153-EDTMP uptake in bone cancer, April, 1985; IND #29156; I-131-metaiodobenzyl guanidine sulfate (I-131-MIBG), May 1984; IND #30,154; I-123-IMP for brain perfusion studies, June, 1987; IND #33,240; Sm-153-EDTMP for palliation of pain in patients with bone cancer, 1998.

SERVICE COMMITTEES:

VA Hospital

VA Research and Development Committee, 1988-1993 and 1998

-present; Chairman, 1990-1993

VA Research Space Committee, 1990-1993 and 1997-present

VA Committee for Core Immunology and Cell Culture Facility, 1990-1993

VA Hospital Radiation Safety Committee, 1983-present; Chairman, 1991-present

University Wide and Columbia Campus

Reactor Safety Subcommittee, 1972-1999

Campus Radiation Safety Committee, 1973-1994 - (Chairman, 1975-1994)
 University Wide Radiation Safety Committee, 1974-1993
 (Chairman, 1982-1993)
 University Wide Risk Management Committee, 1982-1985
 Research Council, Columbia Campus, 1974-77
 Sigma Xi, Research Award Committee, 1979-80 (Chairman)
 Sigma Xi, Nominating Committee, 1982-83 (Chairman)
 Committee on Grant and Contract Incentive Policy for UMC, 1989-90
 Search Committee for Director of MU Research Reactor, 1989-90
 Committee for Review of Programs and Operations of the MU Research
 Reactor, 1989-90
 MURR Research Subcommittee of Reactor Advisory Committee,
 1991-1998
 MURR Reactor Advisory Committee, 1995-present; Chairman 2000-present
 Commission on International Initiatives, 1997-1999
 Life Sciences Mission Enhancement Committee, 1998-present
 Comprehensive Cancer Center Task Force, 1998-present

School of Medicine

Education Council, Medical School, 1981-1984
 Research Council, Medical School, 1979-81, 1984-85, 1988-91, 1995-97
 Promotions and Tenure Committee, Medical School, 1973-74, 1992-1995
 Chairman, 1994-95
 Medical School Self-Study Task Force; Liaison Committee on Medical
 Education, Chair, Basic Science Departments Subcommittee, 1993 and 1999
 Department of Radiology Chairman Search Committee, 1999
 School of Medicine Research Planning Group for Cancer Research, 2001

School of Health Related Professions

Student Affairs Committee, 1979-80
 Promotion and Tenure Committee, 1979-1984
 Nuclear Medicine Technology Educational Program Admissions Committee, 1986-present
 Nuclear Medicine Technology Program Advisory Committee 1986-present

DEPARTMENTAL:

Education Committee, 1980-1986
 Resident Selection Committee, 1980-1990
 Promotion and Tenure Committee, 1978-1987; 1988-present
 Director, Radiological Sciences Section, 1984-present
 Radiology Chairman Search Committee, 1986

PRIMARY CLINICAL SERVICE RENDERED IS IN THE NUCLEAR MEDICINE SECTION AND INCLUDES:

1. Supervision of Radiopharmaceutical Preparation and Quality Control.
2. Primarily responsible for developing and directing special in vitro patient procedures (e.g. ferrokinetics, in vivo cross matches, RBC-sequestration, In-111 White Cells, etc.)

3. Development of special labeling procedures (e.g. Tc-99m-RBC labeling for spleen scans, aerosol inhalation studies, etc.) and develop new analytical methods for QA.
4. Write Investigative New Drug Applications (IND's) to FDA.
5. Major participant in many aspects of the Nuclear Medicine Technology Educational Program.
6. Coordinate clinical protocols in Nuclear Medicine using investigative radioactive drugs (e.g., Study Coordinator for Phase III trials using ^{153}Sm -EDTMP [IND #33,240, as a potential pain palliation drug for bone cancer patients]).

TEACHING ACTIVITIES:

Diagnostic Radiology Residents and Nuclear Medicine Residents:

Radiation Biology, Approx. 10 lectures yearly
 Radiopharmacy in Nuclear Medicine, 10 lectures yearly

Graduate and Undergraduate Teaching:

Radiol. 328 (3 hr) - "Intro. Radiat. Biology", Course Coordinator (course taught every year - Fall Semester); 1972-present

Radiol. Tec. 329 (3 hr) - Radiopharmaceuticals in Nuclear Medicine (course taught every year - Fall Semester); 1976-present

Radiol. 400 and Rad. Tech. 300 - Problems Courses and provided lectures in other UMC courses (e.g. NE 303, Chem. 461)

Medical Students:

Radiology Block, 12 lectures yearly, Risks to personnel and patients from medical radiation exposures.

FUNDED RESEARCH ACTIVITIES (* = direct costs only, all others, indirect costs included)

NSF - CHE - 76 18707

"Photoprocesses in Tryptophan and Model Compounds", \$120,000.* October 1973 - June 30, 1978. Principal Investigator with C. A. Ghiron and R. R. Kuntz.

V. A. MEDICAL PROTOCOL

" $^{99\text{m}}\text{Tc}$ -Labeled Macrocyclic Compounds as New Radiopharmaceuticals". \$30,000.* December 1, 1977 - September 30, 1979. Co-Principal Investigator with R. A. Holmes and D. Troutner.

V. A. MEDICAL PROTOCOL - Merit Review

" $^{99\text{m}}\text{Tc}$ Macrocyclic Amines: A Basis for New Radiopharmaceuticals," \$104,000.* July 1, 1979 - September 30, 1982. Co-Principal Investigator with R. A. Holmes and D. Troutner.

Contract - Mallinckrodt Nuclear

Cd-115/In-115m In Generator and Abscess Localization of $^{115m}\text{In}+3$ in Mice," \$14,800, May 1980 - 1981. Co-Principal Investigator with Drs. G. Ehrhardt and R. A. Holmes.

NIH-NCI-CA27182-D1A1:

"Developing Macrocyclic Amines as Tc-99m-Imaging Agents," \$282,637.* March 1, 1982 - June 30, 1985. Principal Investigator with Drs. D. E. Troutner and R. A. Holmes.

V. A. Medical Research Service Merit Review

"Tc-99m-Labeled Cyclam: A Basis for New Radiopharmaceuticals," \$131,000.* October 1, 1982 - April 1, 1986. Co-Principal Investigator with R. A. Holmes (Co-P.I.) and D. E. Troutner.

DOW Chemical Company

"Tc-99m-Complexation and in vivo Localization of New Sulfonate and Phosphonate Ligands," \$105,000.* March 1, 1982 - February 28, 1984. Principal Investigator.

DOW Chemical Company

"Biocalization Studies With New Bone Therapeutic Agents" \$110,000.* March 1, 1984 - May 31, 1985. Principal Investigator with Drs. D. E. Troutner, L. Corwin and J. Lattimer.

Amersham International

"Evaluation of the Potential of Tc-99m-PnAO and Its Derivatives as Radiopharmaceuticals," \$227,269* October 20, 1983 - October 19, 1986. Co-Principal Investigator with Dr. R. A. Holmes.

Missouri Research Assistant Act, State of Missouri

"Sm-153-Phosphonate Complexes as Therapeutic Agents for Bone Cancer," \$750,000*. June 1, 1985 - May 31, 1988. Principal Investigator, Co-Investigators, D. E. Troutner, J. Lattimer, L. Corwin and G. Ehrhardt.

VA Medical Research Service Merit Review

"Tc-99m Labeled Macrocyclic Amines: A Basis for New Radiopharmaceuticals, \$264,000.* April 1, 1986 - March 31, 1989. Co-Investigator with R. A. Holmes (PI) and D. E. Troutner.

VA Medical Research Service Merit Review

"Tc-99m-HMPAO Labeled Leukocytes and Platelets: Basic and Clinical Studies", \$219,421.*
April 1, 1988-March 31, 1991. Principal Investigator. Co-Investigators: R. A. Holmes and
T. P. Dresser.

U.S. Department of Veterans Affairs

Career Research Scientist Award: August 1, 1988 - March 30, 1999; \$1,040,000*

VA Medical Research Service Merit Review

"Tc-99m Labeled Macrocyclic Amines: A Basis for New Radiopharmaceuticals", \$647,800.*
April 1, 1989-March 31, 1994. Co-Principal Investigator with R. A. Holmes (PI), D. E.
Troutner and T. J. Hoffman.

Department of Energy, DOE-910571-1

"Production of Radiolabeled Monoclonal Antibody Conjugates by Photoaffinity Labeling,"
\$573,689. September 1, 1989-August 31, 1992. Principal Investigator. Co-investigators:
R.R. Kuntz, A.R. Ketring, E.P. Mitchell, T.A. Feldbush and R.A. Holmes.

Department of Veterans Affairs, Medical Research Division

"¹⁵³Sm-EDTMP Chelates as Skeletal Therapeutic Radiopharmaceuticals", \$355,740*; April 1,
1991 - March 31, 1995. Principal Investigator.

Department of Energy, DOE-910571-2

"Production of Radiolabeled Monoclonal Antibody Conjugates by Photoaffinity Labeling,"
\$464,189; September 1, 1992 - October 31, 1995. Principal Investigator. Co-Investigators:
R.R. Kuntz, A.R. Ketring, K.V. Katti, and R.A. Holmes.

Mallinckrodt Medical, Inc.

"Development of New MRI Contrast Agents", \$214,000*; June 1, 1992 - May 30, 1994. Co-
Investigator with A.R. Ketring (PI) and K.V. Katti (Co-PI).

Zynaxis Cell Science, Inc.: "Development of new bifunctional chelates derived from
phosphorus-nitrogen frameworks, \$52,800.* March 1, 1993 - March 1, 1994, K.V. Katti (PI)
and W.A. Volkert (Co-I).

DuPont Merck: "Utility of phosphinimine and related ligands for the design of new ^{99m}Tc and
¹⁸⁸Re radiopharmaceuticals", \$239,657. December 1, 1993 - November 30, 1995. K.V. Katti
(PI), P.R. Singh, W.A. Volkert and A.R. Ketring (Co-I's).

VA Medical Research Service Merit Review

"Development of Tumor Seeking Peptide Receptor Radiopharmaceuticals". \$248,000*, April
1, 1994-March 31, 1996. Co-Principal Investigator with Dr. R. A. Holmes (PI), T.J.
Hoffman (Co-I) and K. V. Katti (Co-I).

DuPont Merck: "Utility of phosphinimine and related ligands for the design of new ^{99m}Tc and
¹⁸⁸Re radiopharmaceuticals", \$145,000, December 1, 1995 - November 30, 1996; K.V. Katti
(PI), P.R. Singh, W.A. Volkert and A.R. Ketring (Co-I's).

Department of Veterans Affairs, Medical Research Division

"Development of GRP receptor-avid radiopharmaceuticals", \$108,200*, October 1, 1996 -
September 30, 1997. W.A. Volkert (PI), T.J. Hoffman, D.K. Strickland, B.S. Greenspan,
T.P. Dresser (Co-I's).

Department of Energy, DEFG02 89E R60875

"Novel Strategies for the Formulation of New Site-Directed Diagnostic and Therapeutic Radiopharmaceuticals", November 1, 1995 - October 31, 1998. Total: \$598,000; W.A. Volkert (PI) (25%), K.V. Katti (Co-PI) (25%); L.R. Forte (Co-I) (5%).

National Institutes of Health (NCI): RO1-CA72942-01 "Development of GRP Receptor-Avid Radiopharmaceuticals", October 1, 1997 - June 30, 2002. Total: \$931,555, W. Volkert (PI) (30%), T. Hoffman, B. Greenspan, T.D. Dresser, Co-I's.

DuPont-Merck: Utility of water-soluble phosphines and related ligands for the design of new ^{99m}Tc and ^{188}Re Radiopharmaceuticals. \$296,562 December 1, 1996 - November 30, 1998. K.V. Katti (PI), W.A. Volkert (10%) and A.R. Ketring (Co-I's).

National Institutes of Health (NCI): RO1-CA72421-01 "Radiolabeling of FABs by Photochemical Conjugation", June 1, 1998 - May 30, 2003. Total: \$464,710; R.R. Kuntz (PI), W. Volkert (Co-I) (5%) and T. Quinn (Co-I).

Department of Energy: DOE-FG02-93E61661 "Radiolabeled Peptide-based Melanoma and Breast Carcinoma Imaging and Therapeutic Agents". March 1, 1997 - February 28, 2000. Total: \$451,787; T.P. Quinn (PI), S.S. Jurisson (Co-I), W.A. Volkert (Co-I) (5%).

DuPont-Merck: Utility of water-soluble phosphines and related ligands for the design of new ^{99m}Tc and ^{188}Re Radiopharmaceuticals. December 1, 1998 - November 31, 2000, \$180,034, K.V. Katti (PI), W.A. Volkert (10%).

Department of Energy, DEFG02 89E R60875

"Novel Strategies for the Formulation of New Site-Directed Diagnostic and Therapeutic Radiopharmaceuticals", November 1, 1998 - April 30, 2002. Total: \$510,000; W.A. Volkert (PI) (25%), K.V. Katti (Co-PI) (25%); L.R. Forte (Co-I) (5%). [One year no-cost extension]

U.S. Department of Veterans Affairs

Senior Research Career Scientist Award; April 1, 1999-October 30, 2001. Total: \$280,000*

DOE DE-FG02-93ER61661 (renewal) Department of Energy

"Melanoma Therapy with Rhenium-cyclized Melanocyte Stimulating Hormone Peptide Analogs. The major goal of the proposed research is to determine the therapeutic efficacy of [Re-188]-CCMSH in melanoma tumor bearing mice". March 1, 2000 - February 29, 2003, Total: \$403,133; T.P. Quinn (PI), S. Deutscher (Co-I) and W.V. Volkert (Co-I) (5%).

National Institute of Health (NCI) P20-CA86290

"Center for single photon-emitting cancer imaging agents: Pre-ICMIC". July 1, 2000 - June 30, 2003. Total: \$1,200,000; W.A. Volkert (PI).

U.S. Dept. of Energy, Radiochemistry Education Award Program, August 1, 1999 - August 31, 2002, \$248,000. W.H. Miller (P.I.), S.S. Jurisson (Co-P.I.), W.A. Volkert (Co-I) (5%).

U.S. Department of Veterans Affairs, Medical Research Division

"Combinatorial Chemistry and Genetics to Develop Tumor-avid Peptides": October 1, 2002 - September 30, 2006. Total: \$671,700; S. Deutscher (PI), W.A. Volkert, Collaborator (5%)

National Institute of Health (NCI) RO1-CA095075

"Colon Cancer Specific Radiodiagnostic/Therapeutic Agents", April 1, 2002 - March 31, 2005, \$769,494; W.A. Volkert (PI)

American Cancer Society (Volkert, Co-I) T.J. Hoffman, PI

"Targeting Prostate Cancer with Peptide Analogs", July 1, 2002 - June 30, 2006, \$735,520

SUBMITTED

Department of Energy: "The Midwest Nuclear Science and Engineering Consortium: An Innovative Approach to Enhancing Nuclear Science Education and Research", SUBMITTED March, 2002, \$10,000,000. W.A. Volkert Department of Energy (W. Miller, PI)

"DOE/Utility Matching Grant Program for Nuclear Engineering", September 1, 2002 - August 31, 2003, \$60,000, SUBMITTED

National Institute of Health (Volkert, Co-I) C.J. Smith, PI

Preparation of Low Valent Tc(I) Imaging Agents, April 1, 2003-March 31, 2005
\$362,500 SUBMITTED May, 2002

Faculty Research Funding - Wynn Volkert

Grant Title	Agency	MU Account #	Funding Period		% Funds to you	Amount Gr.
			Total (mm/yy-mm/yy)	Current Year (mm/yy-mm/yy)		Total Direct/costs Total costs
Development of GRP Receptor-Avid Radiopharmaceuticals	National Institutes of Health (NCI)	ROI-CA72942-03	\$931,555 9/3/97-6/30/02 WAV (PI)	\$190,746 7/1/00-6/30/01		\$639,384 \$931,555
Novel Strategies for the Formulation of New Site-Directed Diagnostic and Therapeutic Radiopharmaceuticals	Dept. of Energy	DEFG0289 ER60875	\$510,000 11/1/98-4/30/02	\$140,690 11/1/00-4/30/01 WAV (PI)		\$351,724 \$510,000
Utility of Water-soluble Phosphines and Related Ligands for the Design of New Tc-99m & Re-188 Radiopharmaceuticals	DuPont-Merck		12/1/93-11/30/00 \$410,285	\$150,746 12/1/98-11/30/00 (K. Kati, PI) WAV (Co-I 10%)		\$281,578 \$410,285
Center for Single Photon-Emitting Cancer Imaging Agents: PRE-ICMIC	National Institutes of Health	DHHS1P20 QA86290-01	\$1,200,000 7/1/00-6/30/03	\$400,000 WAV (PI)		\$852,724 \$1,200,000
Radiolabeling of FABs by Photochemical Conjugation	National Institutes of Health	ROI CA724 21-01	\$464,720 6/1/98-5/30/02	\$106,832 R. Kuntz, PI WAV (Co-I 5%)		\$320,497 \$464,770

CURRICULUM VITAE

I. Personal Data

KATTESH V. KATTI, MS, Ph.D., FRSC

Office: University of Missouri-Columbia
Center for Radiological Research
301 Business Loop 70 West/Room 106
Columbia, MO 65203 USA
Tel. No. (573) 882-5656; FAX: (573) 884-5679
E-Mail: KattiK@health.missouri.edu

Home: 3901 Woodsedge Road
Columbia, MO 65203, USA
(573) 446-4983

Permanent Resident of the United States of America
Married to Kavita and have two children: Sumidha (Girl) and
Nahush (Boy)

II. Education

Karnatak University, B.S. (Chemistry) 1977
University of Mysore, M.S. (Chemistry) 1979
Indian Institute of Science, Ph.D. (Inorganic Chemistry) 1984

III. Post-Doctoral Training

Research Associate, Department of Chemistry, University of Alberta, Edmonton,
Canada, 1987-1989
Alexander von Humboldt Fellow; Institute of Inorganic Chemistry, University of
Göttingen, Göttingen, FRG, 1985-1987

IV. Academic Appointments

Professor of Radiology, University of Missouri, Columbia
September 2002-present
Professor of Physics, University of Missouri, Columbia
September 2002-present
Associate Professor of Physics, University of Missouri, Columbia,
2001-2002
Associate Director, Radiopharmaceutical Sciences Institute,
February 1999-present
Associate Professor of Radiology (with tenure), University of Missouri, Columbia,
Missouri, 1997-2000

Senior Research Scientist, Research Reactor, University of Missouri, Columbia, Missouri, 1997-Present

Professor of Chemistry (Adjunct) 1999-present

Adjunct Associate Professor of Chemistry, University of Missouri, Columbia, Missouri, 1997-1999

Assistant Professor of Radiology, University of Missouri, Columbia, Missouri, September 1993-1996

Research Scientist, Research Reactor, University of Missouri, Columbia, Missouri, 1990-1997

Doctoral and Graduate Faculty Member, University of Missouri, Columbia, Missouri, 1992-present

Research Assistant Professor of Radiology, University of Missouri, Columbia, Missouri, 1990-1993.

Research Scientist, Department of Chemistry, University of Alberta, Edmonton, Canada, 1989-1990

V. (a) Honors and Postdoctorate

Fellow of Royal Society of Chemistry, London, Chem, FRSC (1995)

Alexander von Humboldt Scholar, University of Göttingen, FRG, 1985-1987

Research Fellow, Department of Atomic Energy, India (1979-1984)

Merit Fellowship from the National Council of Educational Research and Training, New Delhi, India (1978-1980)

(b) Discovery/Research Citations

1. Received recognition from Chancellor Richard Wallace for Dr. Katti's research efforts in bringing a gift worth \$3.6 million dollars in the form of Patents and Technologies in Optical Devices from the DOW Chemical Company; MU Press Release August 23, 2000.
2. Dr. Katti's research on the development of new approaches to water-soluble phosphines and their implications in biomedical and catalysis applications was cited in "Inside R&D" Vol. 28, No. 6 (1999) published by John Wiley & Sons in *Technical Insight Series*.
3. Dr. Katti's discovery of using phosphinimine ligands for scavenging technetium was cited in *Chemical & Engineering News*, January 31, 1999.

VI. Professional Affiliations and Other Professional Activities

Alexander von Humboldt Foundation, FRG, 1985-present

American Chemical Society 1989-present

Society of Nuclear Medicine 1990-present

Sigma Xi; Member 1991-present

International Association of Radiopharmacology, 1992-present
Fellow of the Royal Society of Chemistry, London (1995-present)

a. Editorial Commitments

Member of the Editorial Advisory Board for the Journal of Inorganic Chemistry published by the American Chemical Society

Member of the Editorial Board of Journal of "Synthesis and Reactivity in Inorganic and Metal-Organic Chemistry"

Panel member for reviewing papers to
American Chemical Society Journals
Actively involved in refereeing papers for:

J. Medicinal Chemistry
J. Am. Chem. Soc.
Chem Commun.
Inorganic Chemistry
Organometallics
European Journal of Inorganic Chemistry
Bioconjugate Chemistry
J. Chem. Soc. Dalton Transactions
Inorganica Chimica Acta
J. Nucl. Med. & Biology
J. Org. Met. Chemistry
J. Photochemistry Photobiology
J. Mol. Structure
Tetrahedron

b. Peer Reviewing Activity

Reviewer of Grants for the Department of Energy Health and Environmental Sciences
Ad hoc reviewer of grant proposals for National Science Foundation (USA) 1993-present
Ad hoc reviewer of grant proposals for National Science and Engineering Research Council (Canada) 1993-present
Ad hoc review of grant proposals for Research Corporation

c. National/International Conference Organizing Activity

Member of National Organizing Committee for XIV International Conference on Phosphorus Chemistry held in Cincinnati, OH, July 12-17, 1998.

Principal Organizer for a mini symposium on "Recent Advances in the Design and Development of Phosphorus Ligands for Radiopharmaceutical Applications. This meeting is a major international event, held once in three years, and attended by scientists in the fields of chemical and biomedical sciences from all around the world. At the XIV International Conference on Phosphorus Chemistry held in Cincinnati, OH, July 12-17, 1998.

Principal organizer of a symposium on "Recent Advances in Chemical, Catalytic and Biomedical Aspects of Water-Soluble Transition, Metal Compounds" in the Central Region ACS, Midland, MI, May 28-30, 1997.

d. Symposia/Conference Chair

Chairman for Scientific Paper Session at the International Conference on Radiopharmaceutical Chemistry, Brazzonone, Italy, September 2002.

Chairman for Scientific Paper Session at the 15th International Conference on Phosphorus Chemistry; Sendai, Japan, 27 July – 03 August, 2001.

Co-chairman for Scientific Paper Session at XII International Conference on Phosphorus Chemistry at Toulouse, France, July 4-10, 1992.

Chairman for Scientific Paper Session on "Novel Ligands" at American Chemical Society Annual Meeting, August 1993, Chicago, IL.

Chairman for Scientific Paper Session on "Novel Ligands" at American Chemical Society Annual Meeting, March, 1994, San Diego, CA.

Chairman for Scientific Paper Session on "Novel Transition Metal Compounds" at American Chemical Society Annual Meeting, August 25-30, 1996, Orlando, FL.

VII. Administration/Committee Responsibilities

Member of Chancellor's committee on student fee for capital improvement 2002-2005.

Member of MU School of Medicine Appointment, Promotion and Tenure Committee (1997-2000)

Member of MU Research Reactor Research Advisory Committee (1997-98)

Member of School of Medicine Research Council (1997-2000)

Responsible for the administration of Synthetic, Analytical and Radiochemical Laboratories situated in ~2500 square foot area at the Center for Radiological Research.

VIII Major Research Interests

- **Development of Cancer Diagnostic and Therapeutic Agents**
- **Biomedical Optical Imaging**
- **Physics and Chemistry of Materials**
- **Fundamental Aspects of Structure of Water and Water-Alcohol Binary Mixtures.**

a. Specific Details of Current Research Projects

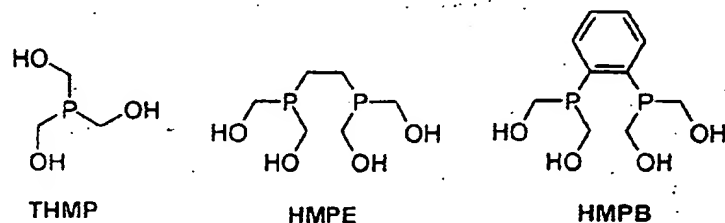
1. Synthetic and mechanistic aspects of main group chemistry as it relates to the design and development of novel ligand systems for use as complexing agents to radio metals of diagnostic and therapeutic importance in the development of site-specific radiopharmaceuticals.
2. Biomedical Optical Imaging
3. Development of new generation of chemotherapeutic agents for cancer therapy.
4. Design and development of water-soluble cross-linkers for use in surgical and non-surgical wound healing applications.
5. Chemical and biomedical aspects of non-linear materials.

1 Design of main group ligands as complexing agents to metallic radioisotopes – Development of site-specific radiopharmaceuticals

In order for a radiolabeled drug to be performance effective under in vivo conditions, the following important attributes must be met under the physiological conditions:

- a. Attachment of radiolabel (β or γ emitter) via the ligand to targeting vectors (peptides/proteins) should not affect the biospecificity of biomolecules.
- b. The attachment of the radiolabel (i.e. β or γ emitting isotope) to the ligand as well as the bonding between the ligand and the biomolecule should be kinetically inert for a specific time period as determined by the half life of the radiometal and also the disease for which imaging/therapy is sought
- c. The radiolabeled ligand which is strongly attached to specific biomolecule should have efficient in vivo bioclearance pathways.

Therefore, it is important to design and develop ligand frameworks that are stable to in vitro/ in vivo conditions, upon radiolabeling, but also be able to form strong covalent links to specific biomolecular vectors (peptides or proteins). With the overall objective of developing appropriate ligand systems for use in the development of site-specific radiopharmaceuticals, several new water-soluble phosphines have been synthesized for use as complexing agents to Tc-99m, Re-188 and Au-198/199 precursors. Representative examples of the ligand systems are depicted below:



The results demonstrate that THMP, HMPE and HMPB ligands complex ^{99m}Tc to form single, positively charged species that have excellent in vitro and in vivo stabilities. Clearance from the blood stream is rapid, primarily via the kidneys into the urine. The ^{99m}Tc chelates with these water-soluble ligands can be formed by 1) simple mixing ^{99m}TcO with excess ligand in water (in this case, the HMP groups will reduce ^{99m}Tc in ^{99m}TcO even though P^{III} centers in THMP, HMPE or HMPB are not oxidized to form P=O with molecular O₂; 2) by reduction of ^{99m}TcO with Sn⁺² or 3) by transchelation from ^{99m}Tc glucoheptonate.

In summary, these studies further demonstrate that ligands containing bis(hydroxymethyl)phosphine groups (i.e., R-P(CH₂OH)₂) are not oxidized

by O_2 in aqueous solutions and can form well-defined, in vivo- stable ^{99m}Tc complexes in high yields. These properties indicate that chelators containing HMP groups will provide a novel and effective vehicle for labeling small biomolecular targeting agents with ^{99m}Tc (and ^{188}Re) for subsequent use in development of site-specific radiopharmaceuticals for cancer diagnosis and therapy.

2. Gold Nano Particles In Biomedical Optical Imaging

Recent interest in the development of new and novel strategies for the generation of gold nano particles stems from their important applications in the areas of material science and biomedicine. Gold nano particles functionalized with oligonucleotides have been used as probes in a variety of DNA detection methods. Nanoparticulate gold is of paramount importance in Biomedical optical imaging modalities because of the superior Surface Enhanced Raman Scattering (SERS) properties of Gold nano particles adsorbed on biological surfaces. Numerous methods reported in the literature rely on the generation of gold nano particles *via* reduction of gold(III) using Sodium borohydride as a reducing agent. Although application of sodium borohydride produce gold nano particles of varying sizes (2-200 nm) in good yields, the powerful adverse reactivity of this reagent towards functional groups present on biomolecules is a serious impediment. Therefore, there is a considerable current interest in the development of gold nano particles under biologically benign conditions. As part of our research efforts in biomedical optical imaging, we have focused our efforts in the optimization of a new methodology for the generation of gold nano particles in water under biologically benign media.

Indeed, recently we have discovered a new and a highly effective method for the production of gold nano particles. This method involves simple mixing of $P(CH_2NHCH(CH_3)COOH)_3$ (THPAL) with $NaAuCl_4$ in water at physiological pH. Gold nano particles generation is achieved within 5 minutes at 25 $^{\circ}C$. Thiol stabilizers which are traditionally used in stabilizing gold nano particles pose serious problems because of their environmental hazards and optical interference in SERS related applications. Our method is unique compared to all methods known to date because THPAL serves the dual roles of gold nano particle stabilizer and a reductant.

We are currently collaborating with Professors Meera and H.R Chandrasekhar for a detailed investigation on the photo physical properties of Gold nano particles. One aspect of our collaborative effort involves for the direct application of gold nano particles for adsorption on bioactive surfaces for potential application in biomedical optical imaging using SERS. Further studies are underway to incorporate gold nano particles on target specific biomolecular vectors for use in optical imaging of tumor tissue.

3. Development of New Generation of Chemotherapeutic Agents

Cis-platin is widely used in the treatment of various different types of cancer in humans. A major disadvantage of treating with cis-platin, especially for longer periods of time, is concerned with its acute toxicity. The high toxicity of cis-platin also restricts its utility in high doses. Therefore, development of new chemotherapeutic agents with efficiency and low toxicity would be critical development of new chemotherapeutic agents with efficiency and low toxicity would be critical determinant in the care and treatment of cancer patients. Dr. Katti and his group have recently developed a new class of Au (I) phosphine complexes. These gold complexes have demonstrated unique cytotoxic and cell cycle arresting properties which make them exciting new candidates for the development of a new class of fold chemotherapeutic agents. To date, we have gathered data demonstrating that Au-THP is cytotoxic against human androgen independent prostatic carcinoma (PC-3 cell line), human androgen dependent carcinoma (LNCap. FGC cell line), human colon carcinoma cells (HCT-15 cell lines), and human gastric carcinoma (AGS).

There remains a tremendous need to develop new therapeutic treatment strategies in end stage and chemotherapeutic resistant neoplasms. Based upon the unique cytotoxic properties exhibited by one of the gold complexes (Au-THP) developed to date, we intend to expand these preliminary studies to evaluate the potential of these types of compounds to inhibit growth of human tumors in an in vivo animal model.

Current Studies in Dr. Katti's program include:

1. Evaluate the in vitro toxicity and establish a minimum effective dose necessary to inhibit cell regulation using Au-THP in a variety of human cancer cell lines.
2. Determine the maximum tolerable dose allowable in a rodent model using single injection multi-dose delivery schedules.

Assess therapeutic efficacy of Au-THP in SCID mice implanted with human prostate tumor xenografts. This study will be conducted to assess the ability of increasing concentrations of Au-THP to control, and inhibit tumor growth in vivo.

This study will be conducted over a 14-week period with 4 groups of animals consisting of a control group and 3 experimental groups. The drug delivery will be scheduled for 10 consecutive days with each of 3 experimental groups receiving an incrementally higher dose of Au-THP. Initial hematology profile data (platelets, RBC's, WBC's) will be measured immediately prior to study initiation and then measured weekly thereafter. Tumor volume and animal body weight will be measured weekly. At study termination, the liver, kidneys, heart, histopathologically analyzed to determine the extent, if any, of toxicity to the renal, hepatobiliary, and cardiac systems.

4. Design and Development of Water – Soluble Cross linkers for use in Surgical and Non-surgical Wound Healing applications.

Most of the cross-linking agents use, to date, in biochemical applications, involve the interaction of NH₂ groups of proteins with aldehydes. The resulting imine linkages are generally unstable under physiological conditions and often require reduction via sodiumborohydride to the corresponding amines. Such chemical manipulations generally result in side-products and also cause denaturing of biomolecules. In this context, the development of more efficient cross-linking agents that are capable of producing strong-covalent bonds between specific site(s) on the protein and cross-linker(s) will enhance the scope and utility of cross linking agents in medical applications. Our studies are directed towards the development of new class of water-soluble cross-linking agents that demonstrate very effective cross linking characteristics upon their reaction with proteins. In fact, recent studies demonstrate that water-soluble phosphine P(CH₂OH)₃ (THMP) induces effective cross-linking in respective proteins: lens crystalline protein, yeast alcohol dehydrogenase and collagen type 6. Typically, the cross-linking occurs, within a few minutes, upon simple mixing of protein solutions with aqueous solutions of the cross-linker. This

cross-linking pathway is non-invasive because the cross-linker does not leave any chemical functionality upon its interaction with proteins. Specifically, water is eliminated in the reactions of this class of cross-linker(s) with proteins. The fact that some of these cross-linkers do not have any UV - absorbance presents realistic prospects for their use in ophthalmic applications as cross linkers for proteins. Cross-linking with collagen may have commercial prospects for development of new wound healing agents for surgical and non-surgical applications.

Further studies to understand the details such as (1) the effect of pH on cross-linking efficiency, (2) effect of concentration dependency of the cross-linker upon degree of cross-linking and (3) effect of chemical backbone of the cross-linker on the efficacy of cross-linking are currently being investigated in my laboratories.

5. Chemical and Biomedical Aspects of New Non-linear Optical Materials

The biomedical applications of non-linear optical (NLO) materials are still in infancy. Part of the problem concerns with difficulties of attaching (NLO) materials to tissue surfaces or to a specific organ. Development of the methods that will allow incorporation of NLO materials on proteins, tissue surfaces and specific organs (including bone surfaces) would be an important determinant in the future progress toward the use of NLO materials for biomedical use. The frequency doubling (or multiplication) effects can be used for diagnosis and also therapy of specific diseases. My research has successfully developed new approaches that would allow direct incorporation of NLO materials on amino acids, peptides and proteins. Therefore, tissue, organ or bone absorption of NLO materials would be possible for use in diagnosis and therapy of cancer. It must be mentioned that the approach we have developed is the first of its kind that allows covalent attachment of NLO materials with biological proteins under biologically benign conditions. Detailed chemical, optical, in vitro and in vivo studies will be carried out to develop a new generation of non-invasive techniques for the detection and therapy of specific diseases. This work is being carried out in active collaboration with Professor P.K.Das of the Indian Institute of Science, Bangalore, India.

IX. Current and Past Funded Research Projects

i. Current Grants

- a Center for Single Photon Emitting Cancer Imaging Agents – NIH Center Grant. K. V. Katti in the role of Director of the Bioconjugation and Radiochemistry core; and also Principal Investigator of a Developmental Grant entitled "Phosphinimine Conjugates For Tc(VII) stabilization in labeling peptides"; 08/01/03-06/30/08. \$ Direct: \$ 6,937,979.; Total(Direct + In Direct) \$10,000,000.
- b Department of Energy: Rhodium-105 Bombesin Analogs for Prostate Cancer Radiotherapy K. V. Katti (Co-PI) (25%), S. Jurisson (PI) T. Hoffman (CO-PI), C. Cutler (CO-PI); Submitted to DOE; 08/01/01-07/31/04; \$761,665.
- c Dow Chemical Company: Through collaboration efforts, K.V. Katti obtained a gift from Dow Chemicals in the form of 11 patents worth \$ 3.6 million in nonlinear optical materials technology. 08/23/2000.

ii. Pending and future grant submission activity:

- a Design and Characterization of Electrochemical Sensors for Detecting Radionuclides and Heavy Metals. Department of Energy, K.V. Katti (PI for MU), C.J. Zhang (PI for U. of Binghamton) and Y. Lin (Investigator for PHNL): Requested Sub-contract to MU: \$193,904 8/1/03-8/1/07 Pending
- b A Novel Gold Agent with G1 Phase Cell Cycle Targeting Properties for Prostate Cancer Therapy; K. V. Katti (PI), T. Hoffman (CO-I), C. Henry (CO-I); S. Casteel (CO-I); To be submitted to DOD; 08/01/03-07/31/07; \$542,530. Pending
- c A Novel Gold Agent with G1 Phase Cell Cycle Targeting Properties for Prostate Cancer Therapy; K. V. Katti (PI), D. Lubhan (CO-I), C. Henry (CO-I), S. Casteel (CO-I); To be submitted to NIH in August 2003, \$962,500.

iii. Past Funded Grants

- a National Cancer Institute: Center for Single Photon-emitting Cancer Imaging Agents: Pre:ICMIC. W.A. Volkert (PI), K.V. Katti Co-investigator (5%) and will direct research efforts toward bioconjugation chemistry of conjugation radiometal labeled complexes with receptor specific peptides/proteins. 9/1/00-8/31/03. \$827,58.

- b Department of Energy: Novel strategies for the formulation of new site-directed diagnostic and therapeutic radiopharmaceuticals. \$410,000 November 1, 1998 - April 31, 2001. K.V. Katti Co-Principal investigator (30%) with W.A. Volkert (PI).
- c Dupont-Merck: Utility of water-soluble phosphines and related ligands for the design of new ^{99m}Tc and ¹⁸⁸Re Radiopharmaceuticals. \$150,746, Jan 1, 1999 - May 30, 2001. K. V. Katti (PI) (80%) and W.A. Volkert. Total grant from its beginning in 1993: \$ 856,253.(Direct Costs)
- d Department of Energy: Production of radiolabeled monoclonal antibody conjugates by photoaffinity labeling, \$589,310; 11/1/92-10/31/95. K.V. Katti (Co-I), W.A. Volkert (PI), A.R. Ketring, R. R. Kuntz and R.A. Holmes.
- e VA Medical Research Service Merit Review: Development of tumor seeking peptide receptor radiopharmaceuticals. \$496,300, April 1, 1994 - March 31, 1996 K.V. Katti (Co-I) (5%) and W. A. Volkert (PI).
- f Dow Chemical Company: New Optoelectronic materials derived from phosphorus ligands. \$50,025 - 4/94-3/96. K.V. Katti (PI) (100%).
- g Zynaxis Cell Science, Inc.: Development of new bifunctional chelates derived from phosphorus--nitrogen frameworks, \$113,800. March 1993 - March 1995. K.V. Katti (PI) (75%) and W.A. Volkert.
- h Mallinckrodt Medicals, St. Louis: Development for new MRI contrast agents and radiopharmaceuticals. \$ 307,815 - 6/1/92 - 5/31/94. K.V. Katti (PI) (33%), A. R. Ketring and W.A. Volkert (Co-Investigators).

iv. Support of students and Post-Doctoral Fellows on grants

The current graduate student and Post-Doctoral Fellow working with Dr. Katti are being supported on current grant funding. All of the previous graduate students and Post-Doctoral Fellows were supported on the grants from DOE or the Corporations outlined.

X. Investigations on Experimental Drugs from Pharmaceutical Companies

In addition to the funded research project with DuPont-merck, the following companies have expressed an interest to work with me.

- a Prinipal Investigator (K.V. Katti, P.I.; W.A. Volkert and A.R. Ketring Co.I's) on "Chemical Modifications and Radiolabeling of U-91502. This is an experimental drug (developed and supplied by Pharmacia and Upjohn) for the treatment of osteoporosis and rheumatoid arthritis.
- b Principal Investigator (K.V. Katti) on a project with Alcon Laboratories, Fort Worth, Texas. This involves screening of silver, gold and rhenium

compounds for potential antibacterial agents for use in treating contact lenses. Based on the results of initial screening, this company has agreed to consider future funding.

XI. Training of Graduate, Undergraduate Students and Post-Doctoral Fellows

a. Graduate Students

I have served as an advisor for the Ph.D. and M.S. programs of the following students:

1. Sukanya Date, M.S. (graduated in May 1996). Thesis title: "New MRI Contrast agents derived from novel phosphorus compounds".

Present position: Research Scientist Coop Program MIT. Boston.

2. Hermo Jimenez, Ph.D. (graduated in May 1995). Thesis title: "Steroid Conjugates of phosphorus-nitrogen compounds".

Present position: Research Chemist, Mallinckrodt Medicals, St. Louis, MO.

3. Meifang Wang, M.S. (graduated in December 1992). Thesis title: "Technetium-99m and Palladium-109 complexes of phosphorus-nitrogen ligands".

Present position: Analytical Chemist, MU Eye Research Unit Columbia, MO.

4. Douglas Berning, Ph.D.; (graduated in May 1997). The overall objective was to design and develop tumor-specific radiopharmaceuticals. Research work involved the development of new water-soluble phosphines and their coordination chemistry with technetium and rhenium. Doug has been successful in synthesizing a number of water-soluble Bisphosphines. Their reactions with TcO have yielded Tc-99m complexes that show high in vitro stability.

Present position: Post-doctoral Fellow, at DOE lab, Los Alamos, NM.

5. C. Jeffery Smith, Ph.D.: (Graduated in May 1997). The overall objective was to design bifunctional chelating agents for the development of site-specific radiopharmaceuticals. Research work involved the design and development of thio ester functionalized bis and multiphosphines. In addition, Jeff's project also focused on the development of bifunctional chelating agents derived from the diphosphine dinitrogen system. These different classes of water-soluble phosphines were investigated, in detail, for their complexation reactions, primary with Tc-99m and Rh-105 (in some instances).

Present position: Research Assistant Professor MU Radiology/Internal Medicine, Columbia, MO.

6. Hari Prasad, Ph.D.: (Graduated in December 1999). Mr. Prasad began as a graduate student to work for his Ph.D. degree on August 1996. Hari was working on the main group/organic chemistry of tetra and pterdentate water-soluble phosphines. The coordination chemistry of such phosphines with radiometals of diagnostic (e.g., Tc-99m) and therapeutic (e.g., Re-188 and Au-199) importance were studied.

Present position: Research Chemist. Lynntech, Inc. College Station, TX.

7. Pillasetty Kishore, M.S.: Mr. Kishore began as a graduate student to work for his Ph.D. in August 1998. He is working on main group chemistry of bifunctional phosphorus ligands and their applications as bioconjugates for the development of peptide labeled tumor specific diagnostic/therapeutic radiopharmaceuticals. He is also involved in the design and development of gold containing chemotherapeutic agents.

b. Graduate committees

I am serving as a member of the graduate committee of the following students.

Kishore Pillarsetty	(Primary Advisor)
Chris Martin	(Ph.D. student in physics)
Jin Juan	(Ph.D. student in physics)
Vijaya Kattumuri	(Ph.D. student in physics)
Mary Lynn Higginbotham	(M.S. student in vet. school)

a. Training of Undergraduate Research Trainees (Sponsored by NSF)

1. Brian Hickory (Fall 1993); Brian worked on the synthesis of main group Hydrazides. He used ^1H and ^{31}P NMR spectroscopy to characterize the new compounds. These ligands were found to be efficient complexing agents with Tc-99m for the development of new radiopharmaceuticals for diagnostic applications.
2. Bryan Wood (Fall 1994); Bryan worked on the synthesis of water-soluble phosphines. He studied the coordination chemistry of this new class of compounds with Tc-99m and rhenium precursors.
3. Lora Tweedy (Fall 1995); Lora worked on the synthesis and characterization of a cyclam derivative functionalized with a water-soluble phosphine $\text{P}(\text{CH}_2\text{OH})_3$. This ligand has demonstrated excellent complexation properties toward Tc-99m. The hydroxy methyl groups of this ligand react with primary/secondary amines at physiological pH. Therefore, its Tc-99m complexes as well as the free ligand can be used to conjugate with specific biomolecules in the design and development of site-specific radiopharmaceuticals
4. Lora Tweedy (Fall 1996); Lora continued the Tc-99m labeling of water-soluble phosphines. Additionally, she (along with D.Berning) was working on the radiochemistry of Au-198. Specifically, she was looking into the labeling of Au-198 using water-soluble phosphine ligands.
5. Heather Marten (Fall 1997); Heather was involved in the development of bifunctional chelating agents based on phosphine frameworks. She was developing P_2N_2 frameworks as potential chelating agents to Tc-99m and rhenium. The overall objective of this project develop effective strategies for labeling biomolecules.
6. Eric Gervais (Fall 1997); Eric was involved in the development of new P_2S_2 -COOH bifunctional chelating agents (BFCA) labeled with Tc-99m and Re-186/188. His work involves detailed radiochemistry to investigate the radiolabeling efficiencies of new BFCAs with technetium-99m and rhenium-186. He will perform HPLC analysis and in vitro studies of labeled chelates so that the most attractive chelate (in terms of labeling efficiency and in vivo/in vitro stability) will be used to incorporate on specific biomolecules.

a. **Postdoctoral Fellows.**

1. Prahlad R. Singh, Ph.D., 1992, Department of Chemistry, University of Missouri, Columbia. Research Project: Development of New MRI Contrast Agents and Radiopharmaceuticals (1/93-4/95).

Present position: Principal Research Scientist at DuPont-Merck, Bellerica, MA.
2. Prezemyslaw Lusiak, Ph.D. Research Project: Development of New Yttrium Complexes of P-N Macrocycles (4/93-8/95).

Present position: Research Chemist, ABC Labs, Columbia, MO.
3. V. Sreenivas Reddy, Ph.D., 1992, Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore, India. Research project: Development of Phosphorus (III) Hydrazides, Phosphinimines and Water-soluble Phosphines; Coordination Chemistry of these Ligands with Transition Metals and Radiometals (1/93-8/97).

Current Position: Research Scientist, Peoples Software, Houston, TX
4. V. Sreenivasa Kara, Ph.D., 1992, Chemistry Dept., Univ. of Hyderabad, India. Research Project: Production of Radiolabeled Monoclonal Antibody Conjugates by photoaffinity Labeling and development of new ligands for the design of site-specific radiopharmaceuticals. (2/94-6/98).

Current Position: Research Fellow, Vion Pharmaceuticals, Connecticut.
5. Roger Schibli, Ph.D., 1996, Paul Scherrer Institute, Switzerland. Research Project: Development of Tc-99m and Re-188/186 chelates of P_2S_2 and P_2N_2 -based hydroxymethyl phosphines. The ultimate objective is to design site-specific radiopharmaceuticals (6/97-8/99).

Current position: Research Scientist, Paul Scherrer Institute, Zurich, Switzerland.
6. Prabhu K. Ramaiah, Ph.D., 1998, Indian Institute of Science, Bangalore, India. Research project: Organic and Bioconjugate

chemistry of P_2N_2 , PS_2 and PNS chelating systems. Conjugation protocols for the attachment of biomolecules with phosphine and carboxylate based ligands.(5/98-3/00)

Current position: Sr. Research Scientist, Indian Institute of Science, Bangalore, India.

7. Kannan Raghuraman, Ph.D., 2000, Indian Institute of Science, India. Research project: New and novel ligands to stabilize Tc-99m and Re-188 catalysts. The overall goal is to develop kinetically inert Tc and Re complexes in +1 oxidation state in order to design tumor specific peptides labeled with radiopharmaceuticals.(3/1/00 continuing).

XII. Teaching Activities

Teaching Program and Statement of Teaching Philosophy

My background and expertise in physics and chemistry of materials and the Bioconjugate aspects of Main Group Chemistry, Transition Metal Chemistry and Inorganic Polymer Chemistry has enabled me to be actively involved in developing and teaching courses in material science, chemistry and pharmaceutical sciences. I strongly believe in the philosophy that teaching activities are as important as developing independent research programs. Therefore, since joining MU-Columbia in 1990, I have been instrumental in the introduction of two graduate level and one undergraduate level courses. I have been actively involved in teaching/training of students at graduate and undergraduate levels. The details of course contents are described below.

Course Descriptions:

(a) Graduate Level Courses:

Phys 416/Chem 439: "Advances in New Materials"

Advances in New Materials is designed for graduate/senior undergraduate students in physics, Chemistry, Biological and Engineering Sciences Departments. This course is aimed at offering an overview of physics, Chemistry and Biological sciences as they related to design and development of new materials. Topics in materials science covering both the fundamental aspects and applied implications will be an integral part of this course.

Chem 401 and Chem 439: "Inorganic Polymer Chemistry"

I introduced this course for the first time on MU-Columbia campus in 1991. This course has been listed in the University Handbook. It was reoffered as Chem. 439 in Fall 1994 and 1997. The course contents included: Fundamental concepts in Main Group; Transition Metal and Organic Chemistry relevant to polymer science; synthetic chemistry of inorganic

polymers; solution properties; chemical, thermal and mechanical properties; physics and chemistry of optoelectronic materials; biodegradation and biocompatibility of inorganic polymers; inorganic polymers in waste management technologies; biochemical and medical aspects of inorganic polymers; hybrid inorganic and organic polymers. Laboratory work included synthesis and characterization of cyclic phosphazenes cyclomatrix phosphazene polymers, polymetalla phosphazenes, and polysiloxanes.

Chem 401: "Organic and Inorganic Aspects of Radiopharmaceutical Chemistry" was introduced by me and Dr. S. Jurisson. It was first offered in Fall 1993. (Team taught with Dr. S. Jurisson) - The course contents included: Chemistry of Technetium, Rhenium, Rhodium, Palladium, Gold, Copper and Yttrium. Chemistry of Lanthanides. Chemistry of Gallium and Indium. Main group chemistry in the development of new ligands, synthetic, spectroscopic and bonding aspects. Organic chemistry of conjugation of ligands to proteins/peptides. Conjugation of ligands and metal complexes to monoclonal antibodies.

Chemistry

Chemistry 490, Graduate Thesis Research: Summer 2001

Chemistry 490, Graduate Thesis Research: Summer 2000

Chemistry 490, Graduate Thesis Research: Summer 1999

Chemistry 490, Graduate Thesis Research: Summer 1998

Chemistry 490, Graduate Thesis Research: Winter 1998

Chemistry 490, Graduate Thesis Research: Fall 1997; Summer, Fall & Winter 1996; 1995; 1994; 1993; 1992

(b) Undergraduate Level Courses

Phys 319: "Physics and Chemistry of Materials"

The essential framework of phys 319 curricula is composed of the scientific and practical interrelationships that encompass physics, chemistry and biology of man made and naturally occurring materials. Instructions in Phys 319 course will emphasize fundamental principles involved in the development, processing, structure, physical/chemical and biological properties of all classes of materials/biomaterials (eg; Semiconductors, Metals and alloys, Ceramics, Polymers, Dielectric materials, Superconductors, Magnetic Materials, Optical Materials, and Biopolymers/Biomaterials/Bioceramics) that are useful to society, rather than one specific classes of materials. This approach to across the board teaching/training reflects the growing coherence and overall importance of materials to establish a sound foundation for later instruction in specific kinds of materials.

Chemistry 361: "Introduction to Radiochemistry", 3 cr. hrs (Team taught with S. Jurisson, A. Ketring and W. Volkert) Winter 1993

Chemistry 12: "First Year Chemistry", (Team taught with E. Schlemper) Fall 1992

Chemistry 12: "First Year Chemistry" (Team taught with E. Schlemper) Fall 1991

Other Teaching Activities

1991-present: I write cumulative exams for the graduate students pursuing Ph.D. degrees in Inorganic and Radiochemistry.

1992-present: Every two weeks, I hold research discussion meetings with my group for 1-2 hours to discuss research developments, recent literature and address on-going research problems/trouble shooting.

1993-present: Once a month, I meet with the research groups of W. Volkert, S. Jurisson and T. Quinn meet for 1-2 hours to discuss research results of mutual interest and of relevance to inorganic and radiochemistry and pharmaceutical undergraduate and graduate programs.

Student Evaluations

The average score received by the collective faculty members teaching 400-based courses, as estimated by the Physics and Chemistry Departments, is approximately 3.0. Thus scores of 3.38 and 3.72 (out of 4.0), received for Dr. Katti's teaching, are well above the departmental average.

XIII. Service/Administration

1. Coordinator of Biweekly Seminar Series for students and Post-doctoral Fellows in the Interdisciplinary Radiochemistry/Radiopharmaceutical Chemistry Graduate Program: Academic Years, 1993 and 1994.
2. Administrator of the (~3000 sq. ft.) laboratories of the research program jointly sponsored by the Department of Radiology and MURR: 1991 - present. Includes Rooms 101-107, 128-133 and 135 at the Alton Building, Ellis Fischel Cancer Hospital.
3. Director of the Radiology/MURR NMR Facility: Housed in Alton Building; this includes a 300 MHz Bruker ARX NMR instrument and was purchased in early 1993. Has a capability for analyses of samples containing ^1H , ^{31}P , ^{13}C and a wide variety of other nuclides.

XIV. Books, Reviews and Book Chapters (*Invited)

1. Katti, K. V., and Raghuraman Kannan, 'Chemical and Biological Aspects of Phosphorus Chemistry' (Book Contract Signed, Writing in Progress)
2. Katti, K. V., Pillarsetty, N.; Kannan, R. New Vistas in Chemistry and Applications of Primary Phosphines. Topics in current chemistry. (Accepted for publication in 2003).
3. Prabhu, K.R., Pillarsetty, K., Gali, H.R., Katti, K.V.: De Novo design of functionalized air stable phosphines - catalytic and biological considerations. Current Science 78(4):431-439, 2000.
4. Katti, K.V. Formylation of functionalized P-H bonds. A novel approach to the design of synthons for use in biomedicine. Proc. Indian. Acad. Sci (Chem. Sci.) 111(3):1-12, 1999.
5. *Katti, K.V. and Gali, H.: Recent advances in the main group and transition metal chemistry of functionalized water-soluble phosphines: Catalytic and biomedical implications. Main Group Chemistry News 7(2):19-17, 1999.
6. *Katti, K.V., Gali, H., Berning, D.E., Smith, C.J.: Design and development of functionalized water-soluble phosphines, catalytic and biomedical implications. Acc. Chem. Res. 32(1), 9-17, 1999
7. *Katti, K.V., Gali, H., Schibli, R., Hoffman, T.J., Volkert, W.A.: $^{99m}\text{Tc}/\text{Re}$ coordination chemistry and biomolecule conjugation strategy of a novel water soluble phosphine-based bifunctional chelating agent. In Technetium and Rhenium in Chemistry and Nuclear Medicine, M. Nicolini and U. Mazzi, eds., Cortina International, Verona, Italy, 5th Ed., 1998.
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12. *Katti, K.V., Role of chemical research and biotechnology in drug targeting. Biotech and Development Rev. 32, 1995.

XV. Bibliography (Publications in peer-reviewed journals):

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Bis[bis(hydroxymethyl)phosphino]benzene Toward Rh(III) Stabilization in Ecofriendly Media." *J. Am. Chem. Soc.* 124, 7276-7277, 2002.

116. Novel Tridentate Water-Soluble Phosphane Based Ligands for Stabilizing Tc(I)/Re(I) Carbonyls for Radiopharmaceutical Applications, K.V. Katti, K. Raghuraman, N. Pillarsetty, W.A. Volkert, S.S. Jurisson and T.J. Hoffman Technetium, Rhenium and Other Metals in Chemistry and Nuclear Medicine. M. Nicolini, U. Mazzi Eds., SGE Editoriali, Padova, Italy. 2002, Volume 6, 69.
117. Katti, K. V.; Kannan, Raghuraman; Katti, Kavita K.; Pillarsetty, Nagavarakishore; Barnes, Charles L. New phosphorus chemistry leads to unnatural amino acid trimers. *Phosphorus, Sulfur and Silicon and the Related Elements*. 177(6-7), 1587-1589, 2002.
118. Kannan, Raghuraman; Pillarsetty, Nagavarakishore; Prabhu, Kandikere Ramaiah; Katti, K. V. Novel green chemistry in the phosphonate assisted catalytic hydrogenation of olefins. *Phosphorus, Sulfur and Silicon and the Related Elements*. 177(8-9), 1951, 2002.
119. Pillarsetty, N.; Katti, K. K.; Hoffman, T. J.; Volkert, W. A.; Katti, K. V.; Kamei, H.; Koide, T. *In Vitro* and *In Vivo* Antitumor Properties of Tetrakis((trishydroxymethyl)phosphine) Gold(I) Chloride. *J. Med. Chem.* 2003, 46(7), 1130-1132.
120. Kothari, K. K.; Pillarsetty, N.; Katti, K. V.; Volkert, W. A. Characterization of complexation reactions of mono- and bidentate-hydroxymethyl phosphine ligands with the organometallic $^{99m}\text{Tc}(\text{I})(\text{OH})_3(\text{CO})_3^+$ synthon. *Radiochim. Acta* 2003, 91, 53-57.
121. Higginbotham, M. L.; Henry, C. J.; Katti, K. V.; Casteel, S. W.; Dowling, P. M.; Pillarsetty, N. Preclinical tolerance and Pharmacokinetic assessment of MU-Gold, a novel chemotherapeutic agent, in laboratory dogs. *Vet. Therap.* 2003, 4, 76-82.
122. Kothari, K. K.; Raghuraman, K.; Pillarsetty, N.; Hoffman, T. J.; Owen, N. K.; Katti, K. V.; Volkert, W. A. Syntheses, in vitro and in vivo characterization of a $^{99m}\text{Tc}(\text{I})$ -tricarbonyl-benzylamino-dihydroxymethyl phosphine (NP_2) chelate. *App. Rad. Iso.* 2003, 58(5), 543-549.
123. Raghuraman, K.; Katti, K. K.; Barbour, L. J.; Pillarsetty, N.; Barnes, C. L.; Katti, K. V. Characterization of Supramolecular $(\text{H}_2\text{O})_{18}$ Water Morphology and Water-Methanol $(\text{H}_2\text{O})_{15}(\text{CH}_3\text{OH})_3$ Clusters in a Novel Phosphorus

- Functionalized Trimeric Amino Acid Host. *J. Am. Chem. Soc.* 2003,125, 6955-6961
124. Optical and Quantum Mechanical Studies of a New Generation of Push-Pull Non Linear Optical Materials, A. Krishnan, P. K. Das, K. Raghuraman, K. Katti, N. Pillarsetty, K. V. Katti. (Manuscript Submitted).
 125. Pillarsetty, N., Prabhu, K. R., Gali, H., Kannan, R., Katti, K. V. and Barnes C. "Synthesis, the first structural analysis & Coordination chemistry of a novel primary bis phosphine Organometallics. Submitted. (Manuscript Submitted).
 126. Building two-dimensional web-like architectures using gold colloids and collagen fibrils, J. Graham, M. Grandbois, K. Raghuraman, K. Katti, K. V. Katti (Manuscript Submitted).
 127. Tridentate "S₂P-Water-Soluble Phosphane" Ligand for Stabilizing Re(I) Carbonyls for Radiopharmaceutical Applications: X-ray Crystal Structure of *fac*-[Re(CO)₃{(CH₃)SCH₂CH₂SCH₂CH₂P(CH₂OH)₂}], K. Raghuraman, N. Pillarsetty, K.V. Katti, W.A. Volkert and S.S. Jurisson (Manuscript in Preparation).

XVI. Patents

1. K. V. Katti, S. R. Karra, D. B. Berning, J. C. Smith and W. A. Volkert, Hydroxymethyl phosphine compounds for use as diagnostic and therapeutic pharmaceuticals and method of making same, Patent US06054115, Issued on 04/25/2000.
2. K. V. Katti, D. B. Berning, W. A. Volkert, A. R. Ketrang and R. J. Churchill. Conjugate and method for forming aminomethyl phosphorus conjugates, Patent US05948386, Issued on 09/07/1999.
3. K. V. Katti, P. R. Singh, V. S. Reddy, K. K. Katti, W. A. Volkert and A. R. Ketrang, Hydroxyalkyl phosphine compounds for use as diagnostic and therapeutic pharmaceuticals, Patent US05876693, Issued on 03/02/1999.
4. K. V. Katti, S. R. Karra, D. E. Berning, C. J. Smith, W. A. Volkert and A. R. Ketrang, Hydroxymethyl phosphine compounds for use as diagnostic and therapeutic pharmaceuticals and method of making same, Patent US05855867, Issued on 01/05/1999.

5. K. V. Katti, D. E. Berning, W. A. Volkert and A. R. Ketring, Hydroxyalkyl phosphine gold complexes for use as diagnostic and therapeutic pharmaceuticals and method of making same, Patent US5843993, Issued on 12/01/1998.
6. K. V. Katti, W. A. Volkert, A. R. Ketring and P. R. Singh, New multifunctional ligands for potential use in the design therapeutic or diagnostic radiopharmaceutical imaging agents, Patent US05601800, Issued on 02/11/1997.
7. K. V. Katti, W. A. Volkert, A. R. Ketring and P. R. Singh, Multifunctional ligand for use as a diagnostic or therapeutic pharmaceutical, Patent US05478774, Issued on 05/14/1996.
8. K. V. Katti, W. A. Volkert, A. R. Ketring and P. R. Singh, Method for treating liquid wastes, Patent US05478474, Issued on 12/26/1995.
9. R. G. Cavell and K. V. Katti, Carbonylation of methanol using a novel transition metal catalyst, Patent US05352813, Issued on 10/04/1994.

XVII. Invited Presentations and Seminars

1. Phosphorus, nitrogen, germanium, tin and silicon based ligand systems in early and late transition metal chemistry. Xth National Science Foundation. Organometallic Workshop, La Jolla, CA, June, 1989.
2. New directions in ligand design for chemistry with the "Early and Late" transition metals. University of Missouri Chemistry Dynamite Seminar, November 26, 1991.
3. First examples of heteroatomic chelation of $^{188}\text{ReO}_4^-/^{99\text{m}}\text{TcO}_4^-$ and PdCl_4^{2-} with a phosphine-phosphineoxide (or a phosphinimine) bridged bifunctional system. *Ninth Intl Symp Radioph Chem*, Paris, France, April 6-10, 1992.
4. Biochemical and catalytic applications of transition metal chemistry derived from novel phosphorus-nitrogen systems. Anorganische Chemisch Laboratorium, University of Amsterdam, The Netherlands, April 16, 1992.

5. Linear, cyclic and polymeric phosphazines as building blocks for new ^{99m}Tc , ^{188}Re and ^{109}Pd complexes. Anorganisch Chemisch Institut, University of Göttingen, Germany, April 13, 1992.
6. Synthesis, structure and reactivity aspects of new multifunctional phosphorus-nitrogen compounds. University of Missouri Research Reactor Seminar, June 3, 1992.
7. New multifunctional phosphorus hydrazides and phosphinimines for complexation with electron poor and electron rich metals. Zynaxis Cell Science, Inc., Malvern, PA, June 22, 1992.
8. The potential of phosphinimines as building blocks for a new generation of radiopharmaceuticals, Toulouse, France, July 8, 1992.
9. Immobilization of inorganic polymers on Buckminsterfullerenes (C_{60}). group meeting at ABC Laboratories, Columbia, MO, August 21, 1992.
10. Novel optoelectronic materials derived from new main group compounds. DOW Chemical Company, Midland, Michigan, March 10, 1993.
11. Functionalization of transition metal complexes with biomolecules (e.g., proteins). Department of Biochemistry, Karnatak University, Dharwad, India, June 10, 1993.
12. Main-group and transition metal chemistry of phosphorus hydrazides. Indian Institute of Science, Bangalore, India, June 20, 1993.
13. Recent advances in the conjugation of peptides and proteins to metal complexes. India International Center, under the auspices of Research and Information Services for the Non-aligned Countries (RIS) Delhi, India, July 22, 1993.
14. ^{99m}Tc and ^{109}Pd complexes of functionalized phosphorus hydrazides. Annual Meeting of the Indian Society of Nuclear Medicine, Northern Chapter, Delhi, India, July 24, 1993.
15. Incorporation of biomolecules on main group compounds and transition metal complexes - potential for the design of new drugs. Center for Multidisciplinary Research and Development, Dharwad, India, August 16, 1993.

16. Functionalized phosphorus - nitrogen compounds as novel ligands to transition metals. Dynamite Seminar at MU Chemistry Department, February 15, 1994.
17. New approaches to phosphonate - based compounds with potential for biochemical applications. Proctor and Gamble Company, Cincinnati, March 1, 1994.
18. Transition metal chemistry of $R_2P-N-N-PR_2$ -type of specialty diphosphines - new directions in the coordination chemistry of phosphine ligands. Invited lecture at 77th Canadian Society for Chemistry, May 29-June 2, 1994, Winnipeg, Canada.
19. New directions in the coordination chemistry of bisphosphines. American Chemical Society Southeastern Regional Meeting, Birmingham, Alabama, October 17-19, 1994.
20. New synthetic approaches to novel bisphosphines - synthetic and catalytic aspects. University of Delft, The Netherlands, April 23, 1995.
21. Synthetic and catalytic implications of the transition metal chemistry of bisphosphanyl hydrazides and water-soluble phosphines. Hoechst Celanese Company, Corpus Christi, Texas, May 2, 1995.
22. Organometallic chemistry of new bisphosphites, synthetic and catalytic aspects. Shell Chemical Company, Houston, TX, June 18, 1995.
23. Biophosphanylhydrazides as novel chelating phosphines in transition metal chemistry-synthetic and catalytic studies. XIIIth International Conference on Phosphorus Chemistry - ICPC, Jerusalem, Israel, July 16-21, 1995.
24. New directions in the organometallic chemistry of bisphosphines: Synthetic and catalytic aspects. Invited lecture at the Indian Institute of Science, Bangalore, India, September 27, 1995.
25. Chemistry in environmentally benign media -- implications in drug design and catalysis. Invited lecture at the Indian Institute of Science, Bangalore, India, October 13, 1995.

26. New technologies in the remediation of nuclear waste. Invited lecture at Chemical Engineering Association, Bangalore, India, November 29, 1995.
27. Organometallic chemistry of a new class of Bis(phosphites)-synthetic and catalytic studies. Chemistry and Biochemistry Department at the University of Colorado, Boulder, June 5, 1996.
28. Use of water-soluble (hydroxymethyl) phosphines in radiopharmaceutical applications. 29th Central Regional ACS Meeting, Midland, MI, May 27-30, 1997.
29. Synthesis, reactivity and coordination chemistry of a new class of water-soluble phosphines. Department of Chemistry, Tohoku University, Japan, July 28, 1997.
30. Formylation of functionalized P-H bonds. A novel approach to the design of synthons for use in biomedicine. International Conference on Modern Trends in Inorganic & Bioinorganic Chemistry; Kanpur, India, December 2-6, 1997.
31. *In vivo* characterization of new Au-198 complexes of hydroxymethyl phosphine ligands. Indo-US Society of Nuclear Medicine, Chandigarh, India, November 17-19, 1997.
32. Formylation of functionalized P-H bonds, a novel approach to the design of synthons for use in nuclear medicine. Annual ACS Meeting, Dallas, TX, March 29-April 2, 1998.
33. Construction of water-soluble phosphines. New advances in aqueous organometallic chemistry. XIVth International Conference on Phosphorus Chemistry, Cincinnati, OH, July 12-17, 1998.
34. $^{99m}\text{Tc}/\text{Re}$ coordination chemistry and biomolecule conjugation strategy of a novel water-soluble phosphine-based bifunctional chelating agent. International Conference on Radiopharmaceutical Chemistry, Brazzonone, Italy, September 1998.
35. Recent advances in the utility of Tc(I) and rhenium(I) compounds in nuclear medicine. Annual ACS Meeting, Anaheim, CA, Special Symposium on Bioconjugate Chemistry, March 22-25, 1999.

36. New synthetic strategies for the formulation of dimeric and trimeric peptides. Trimeris Inc., Raleigh, NC, April 12, 1999.
37. De Novo design of new gold containing chemotherapeutic agents. Modern Trends in Inorganic Chemistry, Bangalore, India, January 18-21, 2000.
38. Design and Development of Optical Imaging Agents; Department of Physics; University of Missouri- Columbia; September 16, 2000.
39. Phosphorus Chemistry In Drug Design; Department of Chemistry, University of Missouri-Columbia; October 21, 2000.
40. New Approaches to Fine Chemicals, Materials Precursors and Pharmaceuticals Intermediates; Aldrich Chemicals Company; October 27, 2000.
41. New Phosphorus Chemistry for the development of unnatural amino acids, 15th International Conference on Phosphorus Chemistry; Sendai, Japan, 27 July – 03 August, 2001.
42. New approaches to Gold based chemotherapeutic agents. University of Hyderabad, India, July 17, 2002.
43. Drug design and development for treating Wilsons disease. Dr. Reddy Foundation- Pharmaceutical company, Hyderabad, India. July 19, 2002.
44. New bioconjugates in drug design. Indian Institute of Science, Bangalore, India, July 28, 2002.
45. Novel Tridentate Water-Soluble Phosphane Based Ligands for Stabilizing Tc(I)/Re(I) Carbonyls for Radiopharmaceutical Applications. International Conference on Radiopharmaceutical Chemistry, Brazzonone, Italy, September 2002.

XVIII Abstracts

International and National Meetings Only

1. Katti, K.V., Rietzel, M., Roesky, H.W.: Cyclometallaphosphazene of Mo, W and Nb. Xth International Conference on Phosphorus Chemistry, Bonn, Germany Federal Republic, August, 1986.

2. Katti, K.V., Cavell, R.G.: New inorganic and organometallic heterocyclic compounds derived from novel heterodifunctional phosphorus-nitrogen ligands. Fifth International Symposium on Inorganic Ring Systems, Amherst, August, 1988.
3. Cavell, R.G., Katti, K.V.: New metallacyclic compounds of Pd(II), Rh(I) and W(0) as potential carbonylation catalysts. Sixth International Conference on Homogeneous Catalysis, Vancouver, Canada, August, 1988.
4. Katti, K.V., Cavell, R.G.: A new approach to tuning of electronic properties of phosphorus and arsenic ligands. CIC Annual, Victoria, Canada, June, 1989.
5. Katti, K.V., Cavell, R.G.: Cyclometallaphosphiniminatophosphane (and arsane) complexes of "early" and "late" transition metals derived from novel heterodifunctional phosphorus and arsenic ligands. XI International Conference on Phosphorus Chemistry, Tallin, USSR, August, 1989.
6. Katti, K.V.: Phosphorus, Nitrogen, Germanium, Tin and Silicon based ligand systems in early and late transition metal chemistry. Xth National Science Foundation, Organometallic Workshop, La Jolla, CA, June, 1989.
7. Katti, K.V., Cavell, R.G.: Facile substitution of an electron rich substituent into halogenoaromatic. ACS Winter Fluorine Conference, January, 1990.
8. Katti, K.V., Cavell, R.G.: Phosphorus and arsine ligands in the heteroatomic chelation of Re(VII), W(0), Rh(I) and Pt(II). ACS National Meeting, Washington, D.C., August 1990.
9. Corlija, M., Katti, K.V., Volkert, W.A., Ketring, A.R., Hoffman, T.J., Higgenbotham, C., Holmes, R.A.: The *in vitro* and *in vivo* properties of a phosphorus trihydrazide (THP) complex with ^{99m}Tc . 38th Annual Meeting, Soc. Nucl. Med., Cincinnati, OH, June 1991.
10. Singh, P.R., Volkert, W.A., Ketring, A.R., Troutner, D.E., Katti, K.K., Katti, K.V.: A new chelating heterodifunctional phosphorus-nitrogen ligand for radiolabeling of proteins. IXth International Symposium on Radiopharmaceutical Chemistry, Paris, France, April 6-10 1992.

11. Katti, K.V., Singh, P.R., Katti, K.K., Kopećka, K., Volkert, W.A., Ketrin, A.R.: First examples of heteroatomic chelation of ReO_4^- / $^{99\text{m}}\text{TcO}_4^-$ and PdCl_4^{2-} with a phosphine-phosphine oxide (or a phosphinimine) bridged bifunctional system. IXth International Symposium on Radiopharmaceutical Chemistry, Paris, France, April 6-10 1992.
12. Volkert, W.A., Singh, P.R., Katti, K.V., Ketrin, A.R., Katti, K.K.: New and versatile multifunctional phosphorus hydrazide ligand formulating neutral-lipophilic complexes of $^{99\text{m}}\text{Tc}$, ^{186}Re and ^{109}Pd complexes. IXth International Symposium on Radiopharmaceutical Chemistry, Paris, France, April 6-10 1992.
13. Jimenez, H., Singh, P.R., Katti, K.V., Ketrin, A.R., Volkert, W.A.: New approaches to Pd-109 chelates and their bioconjugates. 39th Ann. Mtg., Soc. Nucl. Med., Los Angeles, CA, June 9-12, 1992.
14. Wang, M.F., Ge, Y.W., Kopećka, K., Katti, K.V., Singh, P.R., Katti, K.K., Volkert, W.A., Ketrin, A.R., Meyer, K., Corlija, M., Hoffman, T.J., Holmes, R.A.: New Tc-99m radiopharmaceuticals built on multifunctional phosphorus hydrazides. 39th Ann. Mtg., Soc. Nucl. Med., Los Angeles, CA, June 9-12, 1992.
15. Kopećka, K., Katti, K.V., Ketrin, A.R., Volkert, W.A.: Methylene bridged phosphineoxide-phosphine as a versatile chelating agent for Re-188. 39th Ann. Mtg., Soc. Nucl. Med., Los Angeles, CA, June 9-12, 1992.
16. Volkert, W.A., Katti, K.V., Corlija, M., Meyer, K., Franklin, T., Singh, P.R., Ketrin, A.R., Holmes, R.A.: Small molecule neutral-lipophilic Tc-99m agents derived from functionalized phosphinimines. 39th Ann. Mtg., Soc. Nucl. Med., Los Angeles, CA, June 9-12, 1992.
17. Singh, P.R., Katti, K.V., Kopećka, K., Katti, K.K., Ketrin, A.R., Volkert, W.A.: New bifunctional frameworks derived from phosphorus hydrazide chelating agents for labeling proteins with Tc-99m and Re-188. 39th Ann. Mtg., Soc. Nucl. Med., Los Angeles, CA, June 9-12, 1992.
18. Katti, K.V., Katti, K.K., Singh, P.R., Wang, M.F., Ketrin, A.R., Volkert, W.A.: First examples of phosphiniminato complexes of Tc-99m(VII): Formation of neutral $\text{Ph}_3\text{P}=\text{N}-\text{TcO}_3$. 39th Ann. Mtg., Soc. Nucl. Med., Los Angeles, CA, June 9-12, 1992.

19. Katti, K.V., Singh, P.R., Volkert, W.A., Ketring, A.R., Corlija, M., Hoffman, T.J., Holmes, R.A.: The potential of unconventional phosphorus-nitrogen backbone ligands for use in formulating new radiopharmaceuticals. 39th Ann. Mtg., Soc. Nucl. Med., Los Angeles, CA, June 9-12, 1992.
20. Katti, K.V., Singh, P.R., Ketring, A.R., Volkert, W.A.: The potential of phosphinimines as building blocks for a new generation of radiopharmaceuticals. XIIth International Conference on Phosphorus Chemistry, Toulouse, France, July 6-10, 1992.
21. Volkert, W.A., Singh, P.R., Ketring, A.R., Katti, K.V.: Functionalization of new PN ligands with steroids. Am. Chem. Soc. Ann. Mtg., August, 1993, Chicago, IL.
22. Singh, P.R., Katti, K.V., Katti, K.K., Volkert, W.A., Ketring, A.R.: New protein/peptide conjugates from novel PN ligands. Am. Chem. Soc. Ann. Mtg., August, 1993, Chicago, IL.
23. Reddy, V.S., Katti, K.V., Barnes, C.L., Volkert, W.A.: New heterocyclic compounds containing P(III)-N-N bonds. Am. Chem. Soc. Ann. Mtg., August, 1993, Chicago, IL.
24. Katti, K.K., Singh, P.R., Katti, K.V., Volkert, W.A.: Thiosemicarbazide as a building block for new multi-functional ligands. Am. Chem. Soc. Ann. Mtg., August, 1993, Chicago, IL.
25. Katti, K.V., Singh, P.R., Katti, K.K., Volkert, W.A., Ketring, A.R. Applications of functionalized azaphosphanes as novel scavenging agents for TcO_4^- . Migration - 93, December, Charleston, N.C.
26. Katti, K.V., Reddy, V.S.: New coordination chemistry with P^{III} -N(R)-N(R)- P^{III} frameworks. 207th American Chemical Society Ann. Mtg., March, 1994, San Diego.
27. Katti, K.V., Singh, P.R., Lusiak, P., Katti, K.K., Volkert, W.A.: Main group and transition metal chemistry of a new class of phosphorus-nitrogen based macrocyclic compounds. 207th American Chemical Society Ann. Mtg., March, 1994, San Diego.
28. Singh, P.R., Lusiak, P., Katti, K.V., Volkert, W.A., Ketring, A.R., Holmes, R.A.: Evaluation of new Tc-99m chelates of thiol functionalized

- phosphorus hydrazides. Soc. Nucl. Med. Ann. Mtg., June 5-8, 1994, Orlando, FL.
29. Katti, K.V., Singh, P.R., Reddy, S.V., Volkert, W.A.: Reactions of main-group hydrazides with transition metals. Can. Chem. Soc. Ann. Mtg., May 29-June 3, 1994, Winnipeg, Canada.
 30. Singh, P.R., Ketrang, A.R., Volkert, W.A., Katti, K.V.: Potential of phosphinimines and phosphinimine-containing polymers as scavenging agents for the extraction of $^{99m}\text{TcO}_4^-$ from aqueous media. Fourth Intl. Symp. on Tc and Re in Chem. and Nucl. Med., Sept. 12-14, 1994, Bolzano, Italy.
 31. Singh, P.R., Lusiak, P., Katti, K.V., Volkert, W.A., Ketrang, A.R., Holmes, R.A.: Tc-99m chelates of novel amines and carboxylates. Soc. Nucl. Med. Ann. Mtg., June 12-15, 1995, Minneapolis, MN.
 32. Hoffman, T.J., Reddy, V.S., Katti, K.V., Higginbotham, C., Singh, P.R., Ketrang, A.R., Volkert, W.A.: Utilization of a new, water soluble phosphine ligand for complexing and reducing Tc-99m. Soc. Nucl. Med. Ann. Mtg., June 12-15, 1995, Minneapolis, MN.
 33. Katti, K.V., Reddy, S.V., Singh, P.R., Berning, D.E., Smith, C.J., Volkert, W.A., Ketrang, A.R.: New directions in the development of water-soluble phosphines and transition metal compounds. XIIth ICPC, July 16-21, 1995, Jerusalem, Israel.
 34. Katti, K.V. and Reddy, V.S.: Biophosphanylhydrazides as novel chelating phosphines in transition metal chemistry-synthetic and catalytic studies. XIIIth International Conference on Phosphorus Chemistry - ICPC, Jerusalem, Israel, July 16-21, 1995.
 35. Berning, D.B., Reddy, V.S., Katti, K.V., Singh, P.R., Hoffman, T.J., Volkert, W.A., Ketrang, A.R.: New technetium-99m and rhenium complexes of novel water-soluble bis phosphines. 11th International Radiopharmacy Science Symposium, Vancouver, British Columbia, August 12-18, 1995.
 36. Karra, S.R., Katti, K.V., Smith, C.J., Reddy, V.A., Volkert, W.A.: Development of water-soluble diamide-diphosphine ligands. American Chemical Society Annual Meeting, Orlando, FL., August 25-30, 1996.

37. Reddy, V.S., Eisenschmidt T., Katti, K.V. New family of Bis(phosphites) and their coordination chemistry with Rhodium(I). American Chemical Society Annual Meeting, Orlando, Fl., August 25-30, 1996.
38. Katti, K.V., Reddy, V.S., Berning, D.E., Volkert, W.A., Ketrang, A.R. New directions in the design and development of water-soluble transition metal complexes. American Chemical Society Annual Meeting, Orlando, Fl., August 25-30, 1996.
39. Smith, C.J., Katti, K.V., Volkert, W.A. Synthesis and coordination chemistry of new water-soluble bisphosphines. American Chemical Society Annual Meeting, Orlando, Fl., August 25-30, 1996.
40. Smith, C.J., Katti, K.V., Volkert, W.A. Synthesis and structural characterization of water-soluble dithio-bisphosphine rhenium(V) complexes. "Recent advances in the chemical, catalytic and biomedical aspects of water-soluble transition metal compounds". 29th Central Regional ACS Meeting, Midland, MI, May 27-30, 1997.
41. Berning, D., Katti, K.V., Volkert, W.A., Barnes, C. Synthesis, characterization and *in vitro* studies of novel gold complexes of hydroxymethyl mono- and bis-phosphines. "Recent advances in the chemical, catalytic and biomedical aspects of water.
42. Katti, K.V. Use of water-soluble (hydroxymethyl) functionalized phosphines in radiopharmaceutical applications. "Recent advances in the chemical, catalytic and biomedical aspects of water-soluble transition metal compounds". 29th Central Regional ACS Meeting, Midland, MI, May 27-30, 1997.
43. Smith, C.J., Katti, K.V., Higginbotham, C.A., Volkert, W.A., Ketrang, A.R.: *In vivo* studies of Tec-99m complexes derived from a new water soluble dithio(hydroxymethyl) bisphosphines (P_2S_2). 12th International Symposium on Radiopharmaceutical Chemistry, Upssala, Sweden, June, 1997.
44. Berning, D.E., Katti, K.V., Volkert, W.A., Higginbotham, C.A., Ketrang, A.R.: Hydroxymethyl functionalized water-soluble phosphine as building blocks to *in vivo* stable Au-198 complexes. 12th International Symposium on Radiopharmaceutical Chemistry, Upssala, Sweden, June, 1997.

45. Schibli, R., Karra, W.R., Gali, H., Smith, C.J., Katti, K.V., Volkert, W.A.: A Tc-99m-Dithia-di(bis- hydroxymethyl)phosphine conjugate of bombesin. *In vitro* and *in vivo* studies. 45th Ann Mtg Soc. Nucl. Med., Toronto, Canada, June 7-11, 1998.
46. Katti, K.V.: Formylation of functionalized P-H bonds - a novel approach to the design of synthons for use in nuclear medicine. Ann. ACS Mtg., Dallas, TX, March 29-April 2, 1998
47. Katti, K.V., Berning, D.E., Smith, C.J., Gali, H.: Construction of water-soluble phosphines. New advances in aqueous organometallic chemistry. XIVth International Conference on Phosphorus Chemistry, Cincinnati, OH July 12-17, 1998.
48. Smith, C.J., Higginbotham, C., Katti, K.V., Volkert, W.V.: Rhodium-105 complexes of polydentate, aqueous-soluble, phosphine ligands: New radiochemical developments towards radioimmunotherapy. XIVth International Conference on Phosphorus Chemistry, Cincinnati, OH July 12-17, 1998
49. Volkert, W.A., Karra, S.R., Gali, H., Schibli, R., Katti, K.V.: Bifunctional chelation systems based on hydroxymethyl phosphine-based donor groups. XIVth International Conference on Phosphorus Chemistry, Cincinnati, Ohio, July 12-17, 1998.
50. Gali, H., Karra, S.R., Reddy, S.V., Schibli, R., Volkert, W.A., Katti, K.V.: Synthesis of dithio-diphosphine (P_2S_2 -COOH)-based bifunctional chelation agent. Its coupling reactions with peptide analogs and steroids. XIV International Conference on Phosphorus Chemistry, Cincinnati, Ohio, July 12-17, 1998.
51. Katti, K.V., Gali, H., Schibli, R., Volkert, W.A.: $^{99m}Tc/Re$ coordination chemistry and biomolecule conjugation strategy of a novel water-soluble phosphine-based bifunctional chelating agent. International Conference on Radiopharmaceutical Chemistry, Brazzonone, Italy, September 1998.
52. Katti, K.V. De Novo design of new gold containing chemotherapeutic agents. International Conference on Modern Trends in Inorganic Chemistry, Bangalore, India, January 18-21, 2000.

53. Katti, K. V.; Design and Development of Optical Imaging Agents; Department of Physics; University of Missouri- Columbia; September 16, 2000.
54. Katti, K. V.; Phosphorus Chemistry In Drug Design; Department of Chemistry, University of Missouri-Columbia; October 21, 2000.
55. Katti, K. V. New Approaches to Fine Chemicals, Materials Precursors and Pharmaceuticals Intermediates; Aldrich Chemicals Company; October 22, 2000
56. Kothari, K.K., Katti, K. V, Prabhu, K. R., Gali, H., Pillarsetty, N. K., Hoffman, T. J., Owen, N. K., Volkert, W. A., Development of diamido-diphosphine (N_2P_2)-BFCA for labeling cancer seeking peptides via the $^{99m}Tc(I)(CO)_3(H_2O)_3$ intermediate, Society of Nuclear Medicine, St. Louis, June 6, 2000, J. Nucl. Med. 2000, 41, 244p (abst 1079).
57. Katti, K. V., Kannan, R., Pillarsetty, K., and Katti, K. K.; New Phosphorus Chemistry for the development of unnatural amino acids, 15th International Conference on Phosphorus chemistry, Sendai, Japan, 27 July – 03 August, 2001.
58. Kannan, R., Pillarsetty, N., Prabhu, K. R., and Katti, K. V., Novel Green Chemistry in the Phosphonate assisted catalytic hydrogenation of olefins; 15th International Conference on Phosphorus Chemistry, Sendai, Japan, 27 July – 03, August, 2001.
59. K. Raghuraman, N. Pillarsetty, K. R. Prabhu, K. V. Katti, Phosphonate assisted catalytic hydrogenation of Olefins, XVth International Conference on Phosphorus Chemistry (ICPC), Sendai, Japan, July 29-August 3, 2001.
60. K. Raghuraman, N. Pillarsetty, K. R. Prabhu, K. V. Katti. Novel green chemistry in the phosphonate assisted catalytic hydrogenation of olefins. Abstracts of Papers, 222nd ACS National Meeting, Chicago, IL, United States, August 26-30, 2001.
61. K. Raghuraman, N. Pillarsetty, C. Barnes, K. V. Katti, Unprecedented kinetic propensity of hydroxymethyl phosphanes toward Rh(III) stabilization in ecofriendly media, 224th ACS National Meeting, Boston, MA, August 18-22, 2002.

62. K. Raghuraman, N. Pillarsetty, C. Barnes, K. V. Katti, Novel Tridentate Ligands for Re(I) Stabilization, 224th ACS National Meeting, Boston, MA, August 18-22, 2002.

63. D. Papagiannopoulou, K. Raghuraman, N. Pillarsetty, K. V. Katti, C. J. Smith, T. J. Hoffman, N. Owens, M. Greeley, S. S. Jurisson, Synthesis and Biological Evaluation of Novel ^{99m}Tc Tricarbonyl Complexes with Amine Ligands, Scientific Abstracts of the 49th Annual Meeting of the Society of Nuclear Medicine, Los Angeles, CA, June 15-19, 2002.

XIX. Scientific Exhibits

Katti, K.V., Singh, P.R., Ge, Y.W., Volkert, W.A., Ketring, A.R., Corlija, M., Hoffman, T.J., Holmes, R.A.: The potential of unconventional phosphorus-nitrogen backbone ligands for use in formulating new radiopharmaceuticals. 39th Annual Meeting of the Society of Nuclear Medicine, Los Angeles, CA, June 9-12, 1992.

**DECLARATION OF KATTESH V. KATTI RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, Kattesh V. Katti, do hereby declare the following:

1. I am a Professor of Radiology at the University of Missouri-Columbia. My address is 3901 Woods Edge Road, Columbia, Missouri 65203. I have been a professorially-ranked employee of the University of Missouri since 1990. A copy of my professional resume is attached.
2. I was present at NING LI's Doctoral Dissertation defense and served on the Dissertation committee, for the Doctoral Dissertation titled "Synthesis and Characterization of ^{105}Rh -Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", which was prepared and presented in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.
3. I have been requested to prepare and execute the present Declaration to memorialize my current recollection as to the manner in which the oral Dissertation defense and written text of the Doctoral Dissertation of NING LI were handled until immediately after April 22, 1997, i.e., the filing date of U.S. Provisional Application 60/044,409.
4. I was present at the Doctoral Dissertation defense of NING LI on July 24, 1996. The following persons, who served on the Dissertation committee were also present: Dr. Wynn A. Volkert, Professor of Radiological Sciences and Biochemistry; Dr. Thomas P. Quinn, Associate Professor of Biochemistry; Dr. John F. Kauffman, Associate Professor of Chemistry; and Dr. Silvia S. Jurisson, Professor of Chemistry. To the best of my current recollection, we were the only persons present during the Dissertation defense.

**DECLARATION KATTESH V. KATTI RELATING TO DISCLOSURE OF DISSERTATION OF
NING LI, Ph.D.**

5. The Doctoral Dissertation defense of NING LI was not open to the general public.
6. To the best of my current recollection, I received a copy of NING LI's Doctoral Dissertation prior to the Dissertation defense and I did not disclose the information contained therein or discussed during the defense, to third parties.
7. I did not reveal the details of the oral presentation and written text of the Doctoral Dissertation defense of NING LI to any third parties outside the University of Missouri who did not have an obligation of confidentiality.
8. I am not aware of any copies of the Doctoral Dissertation which were provided to anyone other than the following persons, who were the members of the Dissertation committee: Volkert, Jurisson, Quinn, Kauffman, Katti (as described in ¶4). To my recollection these copies were collected by NING LI at the end of the Dissertation defense. I did not retain a copy of the text of the Dissertation after the defense.
9. To the best of my knowledge, the details of the oral Dissertation defense and written text of the Doctoral Dissertation—beyond the details disclosed in the Abstract entitled, "In-Vitro and In-Vivo Characterization of a Rh-105-Tetrathiamacrocyclic Conjugate of a Bombesin Analogue," appearing in the Journal of Nuclear Medicine, Vol. 37, No. 5, May 1996 Supplement—were not disclosed to any third parties outside the University of Missouri who did not have an obligation of confidentiality until after April 22, 1997, the filing date of U.S. Provisional Patent Application No. 60/044,409.
10. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

09/04/03
Date

Kattesh V. Katti
Kattesh V. Katti

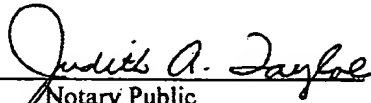
**DECLARATION KATTESH V. KATTI RELATING TO DISCLOSURE OF DISSERTATION OF
NING LI, Ph.D.**

COUNTY OF Boone)
)
STATE OF MISSOURI) ss:
)
UNITED STATES OF AMERICA)

On this 4th day of September, 2003, before me, a Notary Public, personally appeared Kattesh V. Katti to me known to be a person described in and who executed the foregoing Declaration and acknowledged that he executed same as his free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal the date and year last above written.

JUDITH A. TAYLOE
Notary Public - Notary Seal
STATE OF MISSOURI
Howard County
My Commission Expires: Jan 22, 2006


Notary Public

My Commission Expires: 1/22/06

(SEAL)

**DECLARATION OF SILVIA S. JURISSON RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, Silvia S. Jurisson, do hereby declare the following:

1. I am a Professor of Chemistry at the University of Missouri-Columbia. My address is 2409 Lloyd Court, Columbia, Missouri, 65203. I have been a professorially-ranked employee of the University of Missouri since 1991. A copy of my professional resume is attached.
2. I was present at NING LI's Doctoral Dissertation defense and served on the Dissertation committee, for the Doctoral Dissertation titled "Synthesis and Characterization of ¹⁰⁵Rh-Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", which was prepared and presented in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.
3. I have been requested to prepare and execute the present Declaration to memorialize my current recollection as to the manner in which the oral Dissertation defense and written text of the Doctoral Dissertation of NING LI were handled until immediately after April 22, 1997, i.e., the filing date of U.S. Provisional Application 60/044,409.
4. I was present at the Doctoral Dissertation defense of NING LI on July 24, 1996. The following persons, who served on the Dissertation committee were also present: Dr. Wynn A. Volkert, Professor of Radiological Sciences and Biochemistry; Dr. Thomas P. Quinn, Associate Professor of Biochemistry; Dr. John F. Kauffman, Associate Professor of Chemistry; and Dr. Kattesh V. Katti, Professor of Radiology. To the best of my current recollection, we were the only persons present during the Dissertation defense.
5. The Doctoral Dissertation defense of NING LI was not open to the general public.

**DECLARATION SILVIA S. JURISSON RELATING TO DISCLOSURE OF DISSERTATION
OF NING LI, Ph.D.**

6. To the best of my current recollection, I received a copy of NING LI's Doctoral Dissertation prior to the Dissertation defense and I did not disclose the information contained therein or discussed during the defense, to third parties.

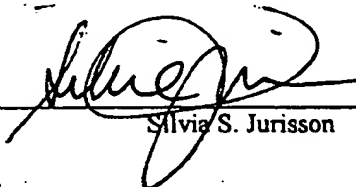
7. I did not reveal the details of the oral presentation and written text of the Doctoral Dissertation defense of NING LI to any third parties outside the University of Missouri who did not have an obligation of confidentiality.

8. I am not aware of any copies of the Doctoral Dissertation which were provided to anyone other than the following persons, who were the members of the Dissertation committee: Volkert, Jurisson, Quinn, Kauffman, Katti (as described in ¶4). To my recollection these copies were collected by NING LI at the end of the Dissertation defense. I did not retain a copy of the text of the Dissertation after the defense.

9. To the best of my knowledge, the details of the oral Dissertation defense and written text of the Doctoral Dissertation—beyond the details disclosed in the Abstract entitled, "In-Vitro and In-Vivo Characterization of a Rh-105-Tetrathiamacrocycle Conjugate of a Bombesin Analogue," appearing in the Journal of Nuclear Medicine, Vol. 37, No. 5, May 1996 Supplement—were not disclosed to any third parties outside the University of Missouri who did not have an obligation of confidentiality until after April 22, 1997, the filing date of U.S. Provisional Patent Application No. 60/044,409.

10. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

9/3/03
Date


Silvia S. Jurisson

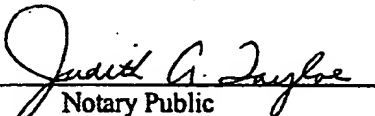
**DECLARATION SILVIA S. JURISSON RELATING TO DISCLOSURE OF DISSERTATION
OF NING LI, Ph.D.**

COUNTY OF Boone)
)
STATE OF MISSOURI) ss:
)
UNITED STATES OF AMERICA)

On this 3rd day of September, 2003, before me, a Notary Public, personally appeared Silvia Jurisson to me known to be a person described in and who executed the foregoing Declaration and acknowledged that he executed same as his free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal the date and year last above written.

JUDITH A. TAYLOE
Notary Public - Notary Seal
STATE OF MISSOURI
Howard County
My Commission Expires: Jan 22, 2006


Notary Public

My Commission Expires: 1/22/06

(SEAL)

Curriculum Vitae
Silvia Sabine Jurisson

Personal Data

Birth Date: 15 July 1956
Birth Place: Elmer, New Jersey
Family: married, two children (ages 3.5 yrs and 9 yrs)
Address: Department of Chemistry
University of Missouri
Columbia, MO 65211
Phone: 573-882-2107

Education

Ph.D. Inorganic Chemistry, University of Cincinnati, December
1982 (Professor E.A. Deutsch, advisor)
B.S. Chemistry, University of Delaware, June 1978

Professional Experience

09/01-present Professor of Chemistry and Radiology
University of Missouri
Columbia, MO 65211

08/97-present: Associate Professor of Chemistry
University of Missouri
Columbia, MO 65211

08/91-08/97: Assistant Professor of Chemistry
University of Missouri-Columbia
Columbia, MO 65211

11/95-present: Research Scientist
Missouri University Research Reactor (MURR)
Columbia, MO 65211

07/89-07/91: Senior Research Investigator
The Bristol-Myers-Squibb Pharmaceutical Research Institute
New Brunswick, NJ

09/86-07/89: Research Investigator
The Squibb Institute for Medical Research
New Brunswick, NJ

09/84-09/86: Postdoctoral Research Associate (with Professor D.E. Troutner)
Chemistry Department,
University of Missouri-Columbia

- 04/84-08/84: Postdoctoral Research Fellow (with Professor A.M. Sargeson)
Research School of Chemistry
Australian National University in Canberra
- 01/83-04/84: Postdoctoral Research Associate (with Professor W.G. Jackson)
Chemistry Department
Faculty of Military Studies
University of New South Wales (Duntroon) in Canberra
- 09/81-04/82: Teaching Assistant, Instrumental Methods Laboratory
University of Cincinnati Evening College
Cincinnati, OH
- 09/81-10/82: Graduate Research Assistant
University of Cincinnati
Cincinnati, OH
- 09/80-06/81: Teaching Assistant, First Year Chemistry
University of Cincinnati Evening College
Cincinnati, OH
- 09/78-08/81: Graduate Teaching Assistant
University of Cincinnati
Cincinnati, OH

Professional and Honorary Societies

American Chemical Society, and its Inorganic Division, its Medicinal Chemistry Division,
and its Nuclear Chemistry and Technology Division
Society of Radiopharmaceutical Chemistry and Biology
Society of Nuclear Medicine
American Association for the Advancement of Science
Sigma Xi
Alpha Chi Sigma
American Women in Science (National and MU Chapter)

Honors and Awards

2002	MU Faculty International Travel Award
2000	MU Faculty Development Leave Award
1996	MU Summer Research Fellowship
1996	MU Alumni Faculty Incentive Award
1995	MU Arts & Science Assistant Professor Travel Award
1993	MU Faculty Development Award
1992	MU Summer Research Fellowship

1981-1982	Procter & Gamble Research Fellowship, University of Cincinnati
1980	University of Cincinnati Research Council Summer Fellowship
1979-1981	Research Associates Fellowship, University of Cincinnati
1979-1980	Senior Teaching Assistant for General Chemistry and Laboratory, University of Cincinnati
1979	Henry Hochstetter Award for Excellence in Teaching

Publications († peer-reviewed)

1. (†) "Calcium Affinity of Coordinated Diphosphonate Ligands. Single-Crystal Structure of $[(en)_2Co(O_2P(OH)CH_2P(OH)O_2)ClO_4 \cdot H_2O]$. Implications for the Chemistry of Technetium-99m-Diphosphonate Skeletal Imaging Agents.", S.S. Jurisson, J.J. Benedict, R.C. Elder, R. Whittle, E. Deutsch *Inorg. Chem.* 1983, 22, 1332-1338.
2. "Technetium Chemistry and Technetium Radiopharmaceuticals", E. Deutsch, K. Libson, S. Jurisson, L.F. Lindoy in Prog. Inorg. Chem. V30, S.J. Lippard (ed), John Wiley & Sons, Inc., 1983, pp. 75-139.
3. (†) "New Oxotechnetium(V) Complexes of N,N'-Ethylenebis(acetylacetonimine), N,N'-Ethylenebis(salicylideneamine), and o-Phenylenebis(salicylidene-amine). X-ray Structures of the Complexes of N,N'-Ethylenebis(acetylacetonimine) and N,N'-Ethylenebis(salicylideneamine)." S. Jurisson, L.F. Lindoy, K.P. Dancey, M. McPartlin, P.A. Tasker, D.K. Uppal, E. Deutsch *Inorg. Chem.* 1984, 23, 227-231.
4. (†) "Synthesis, Characterization, and Electrochemical Properties of Technetium Complexes Containing both Tetradentate Schiff Base and Monodentate Tertiary Phosphine Ligands: Single-Crystal Structure of trans-(N,N'-Ethylenebis(acetylacetoniminato))-bis(triphenylphosphine)technetium(III) Hexafluorophosphate.", S.S. Jurisson, K. Dancey, M. McPartlin, P.A. Tasker, E. Deutsch *Inorg. Chem.* 1984, 23, 4743-4749.
5. (†) "Synthesis and Characterization of Technetium(V) Complexes with Tridentate Schiff Base Ligands. X-ray Crystal Structure of Chloro[N-(2-Hydroxyphenyl)salicylideneiminato]-oxotechnetium(V).", G. Bandoli, U. Mazzi, B.E. Wilcox, S. Jurisson, E. Deutsch *Inorg. Chim. Acta* 1985, 95, 217-223.
6. (†) "Simple Thiocyanate Ion Substitution Reactions: Not So Simple?", W.G. Jackson, S.S. Jurisson, B.C. McGregor *Inorg. Chem.* 1985, 24, 1788-1790.
7. (†) "Synthesis, Characterization, and X-ray Structural Determinations of Technetium(V)-Oxo-Tetradentate Amine Oxime Complexes.", S. Jurisson, E.O. Schlemper, D.E. Troutner, L.R. Canning, D.P. Nowotnik, R.D. Neirinckx *Inorg. Chem.* 1986, 25, 543-549.
8. "The chemistry of technetium(V) complexes containing tetradentate amine oxime ligands: potential brain imaging agents", S. Jurisson, E.O. Schlemper, D.E. Troutner, L.R. Canning, D.P. Nowotnik, R.D. Neirinckx in Technetium in Chemistry and Nuclear Medicine 2, M. Nicolini, G. Bandoli, U. Mazzi (ed), Cortina International, Verona, 1986, pp. 37-41.

9. (†) "Metal Ion Promoted Synthesis of a Monothiocarbamate and Kinetics and Mechanism for Its Oxygen- to Sulfur-Bonded Rearrangement.", W.G. Jackson, S.S. Jurisson *Inorg. Chem.* 1987, 26, 1060-1064.
10. (†) "On the Existence and Lifetime of the $\text{Co}(\text{NH}_3)_5^{3+}$ Intermediate in the Substitution Reactions of $(\text{NH}_3)_5\text{CoX}^{n+}$.", W.G. Jackson, B.C. McGregor, S.S. Jurisson *Inorg. Chem.* 1987, 26, 1286-1291.
11. (†) "Effect of Ring Size on Properties of Technetium Amine Oxime Complexes. X-ray Structures of $\text{TcO}_2\text{Pent}(\text{AO})_2$, Which Contains an Unusual Eight-Membered Chelate Ring, and of $\text{TcOEn}(\text{AO})_2$.", S. Jurisson, K. Aston, C.K. Fair, E.O. Schlemper, P.R. Sharp, D.E. Troutner *Inorg. Chem.* 1987, 26, 3576-3582.
12. (†) "Role of Ion Pairs in Anation Reactions of $(\text{NH}_3)_5\text{CoX}^{n+}$: Capture of the Thiocyanate Ion in Mixed-Anion Competition Studies.", W.G. Jackson, B.C. McGregor, S.S. Jurisson *Inorg. Chem.* 1990, 29, 4677-4683.
13. "Studies of the *in vivo* chemistry of BATOs", D.P. Nowotnik, W. Hirth, S. Jurisson, K.E. Linder, R.K. Narra, A.D. Nunn, W.C. Eckelman in Technetium and Rhenium in Chemistry and Nuclear Medicine 3, M. Nicolini, G. Bandoli, U. Mazzi (ed), Cortina International, Verona, 1990, pp. 393-398.
14. "Template synthesis of technetium and rhenium dioxime complexes: the mechanism of formation of $\text{TcX}(\text{dioxime})_3\text{BR}$ from pertechnetate", K.E. Linder, S. Jurisson, L. Francesconi, D.P. Nowotnik, W.C. Eckelman, A.D. Nunn in Technetium and Rhenium in Chemistry and Nuclear Medicine 3, M. Nicolini, G. Bandoli, U. Mazzi (ed), Cortina International, Verona, 1990, pp. 195-199.
15. "Ligand exchange reactions of Tc and Re dioxime complexes, $\text{MX}(\text{dioxime})_3\text{BR}$, involving the seventh coordination site", S. Jurisson, K.E. Linder, W. Hirth, T. Feld, D.P. Nowotnik, A.D. Nunn, W.C. Eckelman in Technetium and Rhenium in Chemistry and Nuclear Medicine 3, M. Nicolini, G. Bandoli, U. Mazzi (ed), Cortina International, Verona, 1990, pp. 189-193.
16. "Technetium ($^{99\text{m}}\text{Tc}$) Teboroxime.", S. Jurisson *Drugs of the Future* 1990, 15, 1085-1086.
17. (†) "Syntheses, Characterization, and Reactivity of Manganese and Rhenium Dioxime Complexes. X-ray Crystal Structures of $\text{Mn}^{\text{II}}(\text{CDO})(\text{CDOH})_2(\text{BPh}(\text{OCH}_3))_2$, an Unusual Pseudoclathrochelate Complex, and $\text{Re}^{\text{III}}\text{Cl}(\text{CDO})(\text{CDOH})_2\text{BPh}$.", S. Jurisson, L. Francesconi, K.E. Linder, E. Treher, M.F. Malley, J.Z. Gougoutas, A.D. Nunn *Inorg. Chem.* 1991, 30, 1820-1827.
18. (†) "Direct Chromatographic Analysis of Metabolites of Lipophilic Tracers in Whole Blood by ISRP Chromatography.", K. Rosenspire, W. Hirth, S. Jurisson, D.P. Nowotnik, W.C. Eckelman, A.D. Nunn *J. Labelled Compds. Radiopharm.* 1991, 30, 284.

19. (†) "Chloro-Hydroxy Substitution on Technetium BATO ($\text{TcX}(\text{dioxime})_3\text{BR}$) Complexes.", S.S. Jurisson, W. Hirth, K.E. Linder, R.J. DiRocco, R.K. Narra, D.P. Nowotnik, A.D. Nunn *Nucl. Med. Biol.* 1991, 18, 735.
20. "Structure and Stereochemistry in Technetium Coordination Complexes", D.P. Nowotnik, S.S. Jurisson in The Chemistry in Technetium in Medicine, a Nuclear Science Series Publication (NAS-NS-3204), by J. Steigman and W.C. Eckelman, National Academy Press, Washington, D.C., 1992, pp. 111-130.
21. (†) "Direct analysis of whole blood by internal surface reversed-phase chromatography: an examination of the binding and metabolism of technetium dioxime complexes.", K.C. Rosenspire, W. Hirth, S. Jurisson, D.P. Nowotnik, W.C. Eckelman, A.D. Nunn *J. Chromatogr., Biomed. Applic.* 1992, 574, 119-126.
22. (†) "Linkage Isomerization, Acid and Base Hydrolysis and Oxidation Reactions of Coordinated Methanesulfinate: Oxygen and Sulfur-bonded $[(\text{NH}_3)_5\text{Co}(\text{CH}_3\text{SO}_2)]^{2+}$.", W.G. Jackson, S.S. Jurisson, M.A. O'Leary *Inorg. Chem.* 1993, 32, 445-449.
23. (†) "The Single-Pass Cerebral Extraction and Capillary Permeability-Surface Area Product of Several Putative Cerebral Blood Flow Imaging Agents", R.J. DiRocco, D.A. Silva, B. Kuczynski, R.K. Narra, K. Ramalingam, S. Jurisson, A.D. Nunn, W.C. Eckelman *J. Nucl. Med.* 1993, 34, 641-648.
24. (†) "Coordination Compounds in Nuclear Medicine", S. Jurisson, D. Berning, Wei Jia, Dangshe Ma *Chem. Rev.* 1993, 93, 1137-1156.
25. "Technetium" and "Rhenium", E. Deutsch, S. Jurisson in Handbook on Metals in Clinical Chemistry, H.G. Seiler, A. Sigel, H. Sigel (ed), Marcel Dekker, Inc., New York, 1994, pp. 537-540 and 587-591.
26. (†) "Intramolecular Condensation Reactions of S-Methylmethionine Coordinated to Cobalt(III)", P.M. Angus, B.T. Golding, S.S. Jurisson, A.M. Sargeson, A.C. Willis *Aust. J. Chem.* 1994, 47, 501.
27. (†) "Boronic acid adducts of technetium dioxime (BATO) complexes derived from quinuclidine benzilate (QNB) boronic acid stereoisomers: syntheses and studies of their binding to the muscarinic acetylcholine receptor.", S.S. Jurisson, J. Pirro, R.J. DiRocco, K.C. Rosenspire, E. Jagoda, P. Nanjappan, W.C. Eckelman, D.P. Nowotnik, A.D. Nunn *Nucl. Med. Biol.* 1995, 22, 269-282.
28. (†) "BATO complexes derived from dimethoxy dioximes: Synthesis, characterization and biodistribution", K. Ramalingam, S.S. Jurisson, D.P. Nowotnik, A.D. Nunn *Nucl. Med. Biol.* 1995, 22, 625-635.
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30. "Technetium-99m Chelates as Radiopharmaceuticals", W.A. Volkert, S. Jurisson in TOPICS IN CURRENT CHEMISTRY, Technetium and Rhenium - Their Chemistry and Its Applications, Vol. 176, 1996, Springer-Verlag, New York, pp. 123-148.
31. (†) "Pentadentate Chiral Amine-Phenol Ligands: Synthesis and Radiochemical Studies with ^{99m}Tc ", M.R.A. Pillai, K. Kothari, S. Jurisson *Appl. Radiat. Isot.* 1995, 46, 923-927.
32. (†) "A Novel Organometallic Host for the Perrhenate Anion", K. Travis Holman, M.M. Halihan, J.W. Steed, S.S. Jurisson, J.L. Atwood *J. Am. Chem. Soc.* 1995, 117, 7848-9.
33. (†) "A Rh-105 Complex of the Tetrathiacyclohexadecane Diol with Potential for Formulating Bifunctional Chelates (BFCs)", M. Venkatesh, W.A. Volkert, E.O. Schlemper, A.R. Ketring, S.S. Jurisson *Nucl. Med. Biol.* 1996, 23, 33-40.
34. "Technetium", S. Jurisson, in the McGraw-Hill Encyclopedia of Science and Technology, 8th edition, McGraw-Hill, Inc., 1997.
35. (†) "Inclusion of Neutral and Anionic Guests Within the Cavity of π -Metalated Cyclotrimeratrylene", K.T. Holman, M.M. Halihan, S.S. Jurisson, J.L. Atwood, R.S. Burkhalter, A.R. Mitchell, J.W. Steed *J. Am. Chem. Soc.* 1996, 118, 9567-9576.
36. (†) "Rhodium(III) Complexes with Acyclic Tetrathioether Ligands. Effects of Backbone Chain Length on the Conformation of the Rh(III) Complex", N. Goswami, R. Alberto, C.L. Barnes, S. Jurisson, *Inorg. Chem.* 1996, 35, 7546-7555.
37. (†) "Synthesis and crystal structure of a novel trinuclear copper(II) complex from amine-phenol ligand", S. Kannan, M.R.A. Pillai, P.A. Droege, S. Jurisson, C.L. Barnes, *Inorg. Chim. Acta* 1997, 254, 397-400.
38. (†) "Determination of Technetium-99 in Aqueous Solutions by Inductively Coupled Plasma Mass Spectrometry", R.C. Richter, S.R. Koirtiyohann, S.S. Jurisson, *J. Anal. Appl. Spect.* 1997, 12, 557-562.
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(61) "Synthesis of N-succinimidyl 4-radioiodobenzoate labeled alpha-MSH analogues with improved melanoma cellular retention", Z. Cheng, J.Q. Chen, T.P. Quinn, S.S. Jurisson, presented at the 221st National Meeting of the American Chemical Society, San Diego, CA, 1-5 April 2001.

(62) "Optimization of the in vivo biological properties of ¹¹¹In labeled DOTA-Rhenium-Cyclized α -MSH analogues", Z. Cheng, J.Q. Chen, T.P. Quinn, S.S. Jurisson, presented at the 48th Annual Meeting of the Society of Nuclear Medicine, Toronto, Ontario, 25-29 June 2001.

(63) "Radioiodination of Rhenium Cyclized α -MSH analogs via D-Lysine", Z. Cheng, J.Q. Chen, T.P. Quinn, S.S. Jurisson, presented at the 48th Annual Meeting of the Society of Nuclear Medicine, Toronto, Ontario, 25-29 June 2001.

(64) "Metallated cyclotrivenatrylenes as anion hosts", Jerry L. Atwood, K. Travis Holman, and Silvia S. Jurisson, presented at the 222nd National Meeting of the American Chemical Society, Chicago, IL, 26-30 August 2001.

(65) "Radiolabeled α -MSH Analogs for Targeting Melanoma", S. Jurisson, presented at the National Minority Undergraduate Research Symposium, Cancun, Mexico, 18-20 October 2001 (invited).

(66) "Re and Tc Cyclized α -MSH Analogs for Targeting Melanoma", S. Jurisson, T. Quinn, presented at the American Association for Cancer Research Special Conference on Molecular Imaging in Cancer: Linking Biology, Function and Clinical Applications In Vivo, 23-27 January 2002, Lake Buena Vista, FL (invited).

(67) "Biodistributions of Streptavidin/CC49 scFv₄-Pretargeted ¹⁴⁹Pm-, ¹⁶⁶Ho- and ¹⁷⁷Lu-DOTA-Biotin in Tumor-Bearing Mice", J. Zhang, N.K. Owen, C.S. Cutler, F. Jia, D. Mazuru, A.D. Lewis, J. Schultz, L.J. Theodore, D.B. Axworthy, S.S. Jurisson, M.R. Lewis, presented at the Annual Meeting of the Society of Nuclear Medicine, 15-19 June 2002, Los Angeles, CA.

(68) "Synthesis and Biological Evaluation of Novel ^{99m}Tc Tricarbonyl Complexes with Amine Ligands", D. Papagiannopoulou, K. Raghuraman, K. Pillarsetty, K.V. Katti, C.J. Smith, T.J. Hoffman, N. Owens, M. Greeley, S.S. Jurisson, presented at the Annual Meeting of the Society of Nuclear Medicine, 15-19 June 2002, Los Angeles, CA.

(69) "Chelates for Therapeutic Radiometals", S. Jurisson, presented at the Annual Meeting of the Society of Nuclear Medicine, 15-19 June 2002, Los Angeles, CA (invited).

(70) "Rhodium-105 Complexes as Potential Radiopharmaceuticals", S.S. Jurisson, presented at the Gordon Research Conference on Metals and Medicine, 22-26 July 2002, Colby-Sawyer College, NH (invited).

(71) "Direct Peptide Labeling with Technetium and Rhenium: our Alpha-MSH Experience", S. Jurisson, presented at Technetium, Rhenium and Other Metals in Chemistry and Nuclear Medicine, Bressanone, Italy, 4-7 September 2002 (invited).

(72) "Unprecedented Kinetic Propensity of Hydroxymethyl Phosphanes Toward Rh(III) Stabilization in Ecofriendly Media", K. Raghuraman, N. Pillarsetty, W.A. Volkert, C. Barnes, S. Jurisson, K.V. Katti, presented at the 224th ACS National Meeting, 18-22 August 2002, Boston, MA.

(73) "Production and Supply of High Specific Activity Radioisotopes for Radiotherapy Applications", Ketring A.R.; Embree M.F.; Bailey K.; Tyler T.T.; Gawenis J.A.; Jurisson S.S.; Engelbrecht H.P.; Cutler C.S.; *Proceedings from the 8th Congress of the World Federation of Nuclear Medicine and Biology*, Santiago, Chile September 29-October 4, 2002.

(74) "Production of Rh-105 from Ru-104", Engelbrecht H.P.; Cutler C.S.; Ketring A.R.; Ehrhardt G.J.; Moustapha M.E.; Higgins B.J.; Jurisson S.S.; 37th ACS Midwest Regional Meeting - MWRM, Lawrence, Kansas, October 23-25, 2002.

(75) "Structural Determination of ^{99}Tc Radiopharmaceuticals and Compounds Using X-ray Absorption Spectroscopy", Terry, J.; Grzenia, B.; Papagiannopoulou, D.; Kyger, J.; Jurisson, S.; Robertson, J. D.; MARC IV Conference, Kona, HI, April 2003.

(76) "Production of Carrier Free Radioisotopes for Radiotherapy", Cutler, C.S.; Engelbrecht, H.P.; Embree, M.F.; Bailey, K.D.; Clark, J.M.; Moustapha, M.; Jurisson, S.S.; Ketring, A.R.; 15th International Symposium on Radiopharmaceutical Chemistry & Biology, Sydney, Australia August 10-14, 2003.

(77) "Rh-105 Complexes of Hydroxymethylphosphines as Potential Therapeutic Radiopharmaceuticals", Jurisson, S.S.; Papagiannopoulou, D.; Engelbrecht, H.; Kannan R.; Cutler, C.; Hoffman, T.; Katti, K.V.; 226th ACS National Meeting, New York, New York, September 7-11, 2003.

Patents/Patent Applications

"Re tris dioxime complexes of the form $\text{ReX}(\text{dioxime})_3$ as potential radiotherapeutic agents and as a means of preparing boronic acid capped radiotherapeutic agents.", S.S. Jurisson, L. Francesconi, K.E. Linder, US and European patent applications filed and awarded. Bristol-Myers-Squibb holds the rights.

"BATO and BAREO complexes ($\text{MX}(\text{dioxime})_3\text{BR}$, $\text{M}=\text{Tc}$, Re) derivatized with biochemical/biological molecules as potential diagnostic and radiotherapeutic agents.", S.S. Jurisson, K.E. Linder, D.P. Nowotnik, A.D. Nunn, US and European patent applications filed and awarded. Bristol-Myers-Squibb holds the rights.

"Thioether Compounds for Use in Preparing Bifunctional Chelating Agents for Therapeutic Radiopharmaceuticals", M. Venkatesh, S.S. Jurisson, E.O. Schlemper, W.A. Volkert, A.R. Ketring, US patent application filed by the University of Missouri, May 1, 1994. South African patent issued April 1996. University of Missouri holds the rights.

"Melanotropin Analogs for Potential Radiopharmaceuticals for Diagnosis and Treatment of Melanoma", S.S. Jurisson, T.P. Quinn, M.F. Giblin, US 6,338,834 B1, January 15, 2002.

Invited Research Lectures

Washington University, Department of Radiology, 11 January 2002

University of Memphis, Department of Chemistry, 15 November 2001

Dow Chemical Company, Freeport, TX, 7 November 2001

Argonne National Laboratory, Chemistry Division, Chicago, IL, 4 December 2000

Brookhaven National Laboratory, Medical Applications Division, Upton, NY, 27 July 2000

Wichita State University, Department of Chemistry, Wichita, KS, April 1999.

New York Academy of Science, Symposium on Metals in Biology and Medicine, 14 November 1996.

Truman State University, Department of Chemistry, 20 September 1996.

Texas A & M University, Department of Chemistry, September 1995.

University of Kentucky, Department of Chemistry, February 1995.
 University of Cincinnati, Department of Chemistry, May 1994.
 Benedictine College, Department of Chemistry, Atchison, KS, February 1994.
 Northern Illinois University, Department of Chemistry, February 1993.
 Central Missouri State University, Department of Chemistry, November 1992.
 Wichita State University, Department of Chemistry, Wichita, KS, September 1992.

Invited Course Lectures

"Radiochemistry and Radiopharmaceutical Chemistry at the University of Missouri",
 American Chemical Society Summer School in Nuclear Chemistry, Brookhaven National
 Laboratory, Upton, NY, 26 July 2001.

"Radiochemistry and Radiopharmaceutical Chemistry at the University of Missouri",
 American Chemical Society Summer School in Nuclear Chemistry, Brookhaven National
 Laboratory, Upton, NY, 27 July 2000.

"Radiopharmaceutical Chemistry and Radionuclide Production at the University of
 Missouri", American Chemical Society Summer School in Nuclear Chemistry, San Jose
 State University, San Jose, CA, 17 July 1997.

"The Use of Radioisotopes in Medicine", University of Kentucky, NSF funded summer
 school on nuclear and radiochemistry for instructors from 4 year colleges in KY, August
 2-3, 1995, Lexington, KY.

Invited 1 week lecturer for the International Atomic Energy Association (IAEA) for a
 Training Course on Radiopharmaceutical Chemistry held in Bangkok, Thailand, June 21-
 25, 1995.

Service Activities (at MU)

DEPARTMENTAL

1991-1994	Member, Graduate Recruiting Committee
1992-present	Member, Catalyst Club
1992	Member, Faculty Search Committee for Chair of Department of Chemistry
1994	Member, Faculty Search Committee for Department of Chemistry (Inorganic Chemist)
1994-present	Member, Advisory Committee to the Chair
1995	Chair, Rose Houchins Professor in Radiochemistry Search Committee (not filled)
2002	Chair, Faculty Search Committee for Joint Chemistry/MURR Radioanalytical Chemist (J. David Robertson hired)
1998	Chair, Faculty Search Committee for Joint Chemistry/MURR Radiopharmaceutical Chemist (not filled)
1999-present	Member, Departmental Graduate Committee
1999	Chair, Faculty Search Committee for Joint Chemistry/MURR Radiopharmaceutical Chemist (Susan Z. Lever hired)

1999, 2000	Chair, Faculty Search Committee for an Actinide Radiochemist
2001	Chair, Departmental Promotion and Tenure Committee for Assistant Professor Sheryl Tucker
2002	Chair, Departmental Promotion Committee for Associate Professor John Adams
2003-present	Associate Chair for Graduate Studies (officially beginning January 2003)

ARTS & SCIENCE

1995-present	Member, Arts & Science Status of Women Committee
1996	Member, Faculty Search Committee for the Department of Physics and Astronomy
1996-present	Awards Committee, Arts & Science Blackburn-Hesemann Scholarship Fund for undergraduates in the life sciences

CAMPUS

1993-present	Member, Hughes Committee
1996-present	Alternate, Reactor Advisory Committee.
1996-present	Technical Reviewer for the University's Technology Program, University of Missouri Office of Patents & Royalties
1996/1997	Member, Search Committee for Director of MURR
1997-present	Member, Campus Radiation Safety Committee
1998-present	Technical Reviewer, Research Board Proposals
2001- present	Chair, Campus Radiation Safety Committee
2001- present	Member, McNair Scholars Committee

Professional Service

1995	Chairman, University of Missouri-Columbia Section of the American Chemical Society
1994	Chairman-Elect, University of Missouri-Columbia Section of the American Chemical Society
1993-8	Ad Hoc Member, Diagnostic Radiology Study Section, National Institutes of Health
1998-present of	Member, Diagnostic Radiology Study Section, National Institutes of Health
1987-present	Referee for Nuclear Medicine and Biology/International Journal of Applied Radiation and Isotopes
1994-present	Member of the Editorial Board for Nuclear Medicine and Biology/International Journal of Applied Radiation and Isotopes
1988-present	Referee for Inorganic Chemistry
1989-present	Referee for the Society of Nuclear Medicine, Abstracts for the Tc/Re Radiopharmaceutical Chemistry Section
1995-present	Referee for Tetrahedron

1995-present	Referee for Chemical Reviews
1996-present	Referee for the Journal of Medicinal Chemistry
1997-present	Referee for Journal of the American Chemical Society
2001-present	Editorial Board, Journal of Radioanalytical and Nuclear Chemistry
2002-present	Member, Board of Directors, Radiopharmaceutical Science
Council,	
	the Society of Nuclear Medicine
2002-present	Member, Department of Energy, Nuclear Energy Research
Advisory	
	Committee
2002-present	Alternate Councilor, Division of Nuclear Chemistry and
Technology,	
	American Chemical Society

Courses Taught

Chemistry 33, General Chemistry 3, 2 cr. hrs.
 Chemistry 41, Honors Intensive General Chemistry, 5 cr. hrs.
 Chemistry 141, Inorganic Chemistry, 3 cr. Hrs.
 Chemistry 223, Quantitative Analysis, 4 cr. hrs.
 Chemistry 341, Inorganic Chemistry, 3 cr. hrs.
 Chemistry 361, Introduction to Radiochemistry (Team taught with Dr. W. Miller), 3 cr. hrs.
 Chemistry 461, Advanced Radiochemistry (Team taught with Dr. A. Ketring, 3 cr. hrs.
 Chemistry 401, Organic and Inorganic Aspects of Radiopharmaceutical Chemistry (Team taught with Drs. K. Katti and P. Singh), 3 cr. hrs.
 Chemistry 150, Undergraduate Research, 3 cr. hrs.
 Chemistry 250, Senior Undergraduate Research, 3 cr. hrs.
 Chemistry 298/299, Senior Honors Research, 3 cr. hrs. each
 Chemistry 490, Graduate Thesis Research

**DECLARATION OF THOMAS P. QUINN RELATING TO DISCLOSURE OF DISSERTATION
OF NING LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, Thomas P. Quinn, do hereby declare the following:

1. I am an Associate Professor of Biochemistry at the University of Missouri-Columbia. My address is 5700 S. Sinclair Road, Columbia, Missouri 65203. I have been a professorially-ranked employee of the University of Missouri since 1991. A copy of my professional resume is attached.

2. I was present at NING LI's Doctoral Dissertation defense and served on the Dissertation committee, for the Doctoral Dissertation titled "Synthesis and Characterization of ¹⁰⁵Rh-Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", which was prepared and presented in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

3. I have been requested to prepare and execute the present Declaration to memorialize my current recollection as to the manner in which the oral Dissertation defense and written text of the Doctoral Dissertation of NING LI were handled until immediately after April 22, 1997, i.e., the filing date of U.S. Provisional Application 60/044,409.

4. I was present at the Doctoral Dissertation defense of NING LI on July 24, 1996. The following persons, who served on the Dissertation committee were also present: Dr. Wynn A. Volkert, Professor of Radiological Sciences and Biochemistry; Dr. Silvia S. Jurisson, Professor of Chemistry; Dr. John F. Kauffman, Associate Professor of Chemistry; and Dr. Kattesh V. Katti, Professor of Radiology. To the best of my current recollection, we were the only persons present during the Dissertation defense.

5. The Doctoral Dissertation defense of NING LI was not open to the general public.

**DECLARATION THOMAS P. QUINN RELATING TO DISCLOSURE OF DISSERTATION OF
NING LI, Ph.D.**

6. To the best of my current recollection, I received a copy of NING LI's Doctoral Dissertation prior to the Dissertation defense and I did not disclose the information contained therein or discussed during the defense, to third parties.

7. I did not reveal the details of the oral presentation and written text of the Doctoral Dissertation defense of NING LI to any third parties outside the University of Missouri who did not have an obligation of confidentiality.

8. I am not aware of any copies of the Doctoral Dissertation which were provided to anyone other than the following persons, who were the members of the Dissertation committee: Volkert, Jurisson, Quinn, Kauffman, Katti (as described in ¶4). To my recollection these copies were collected by NING LI at the end of the Dissertation defense. I did not retain a copy of the text of the Dissertation after the defense.

9. To the best of my knowledge, the details of the oral Dissertation defense and written text of the Doctoral Dissertation—beyond the details disclosed in the Abstract entitled, "In-Vitro and In-Vivo Characterization of a Rh-105-Tetrathiamacrocycle Conjugate of a Bombesin Analogue," appearing in the Journal of Nuclear Medicine, Vol. 37, No. 5, May 1996 Supplement—were not disclosed to any third parties outside the University of Missouri who did not have an obligation of confidentiality until after April 22, 1997, the filing date of U.S. Provisional Patent Application No. 60/044,409.

10. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

9/3/03
Date


Thomas P. Quinn

COUNTY OF

Boone

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)

DECLARATION THOMAS P. QUINN RELATING TO DISCLOSURE OF DISSERTATION OF
NING LI, Ph.D.

STATE OF MISSOURI

) ss:

UNITED STATES OF AMERICA

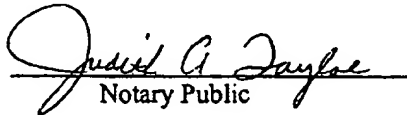
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On this 3rd day of September, 2003, before me, a Notary Public, personally appeared Thomas P. Quinn to me known to be a person described in and who executed the foregoing Declaration and acknowledged that he executed same as his free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal the date and year last above written.

JUDITH A. TAYLOE
Notary Public - Notary Seal
STATE OF MISSOURI
Howard County
My Commission Expires: Jan 23, 2006


Notary Public

My Commission Expires: 1/22/06

(SEAL)

Curriculum Vitae

Thomas P. Quinn

Business Address:

Department of Biochemistry
117 Schweitzer Hall
University of Missouri-Columbia
Columbia, MO 65211 USA

Tel: 573-882-6099

Fax: 573-884-4812

Email: quinnt@missouri.edu

Home Address:

5700 Sinclair Rd.
Columbia, MO 65203 USA
Tel: 573-445-5592

Education:

July, 1988	Ph.D. Cell and Molecular Biology St. Louis University, St. Louis, Missouri
May, 1983	B.S. Biochemistry University of Miami, Coral Gables, Florida

Professional Experience and Training:

September 1, 2000 - present:	Associate Professor of Radiology, University of Missouri-Columbia.
September 1, 2000 - present:	Director Structural Biology Core, The Molecular Biology Program, University of Missouri-Columbia.
September 1, 2000 - present:	Associate Director: Biological Targeting Agent Design, Radiopharmaceutical Sciences Institute, University of Missouri-Columbia.
September 1, 1998 - present:	Associate Professor Biochemistry, The Molecular Biology Program, University of Missouri-Columbia.
September 15, 1991 - 1998	Assistant Professor of Biochemistry, The Molecular Biology Program, University of Missouri-Columbia.
November, 1988- September, 1991	NIH Postdoctoral Fellow, Department of Biochemistry, Duke University, Durham, North Carolina (Mentors: David and Jane Richardson).
August, 1988 - November, 1988	Postdoctoral Fellow, Department of Pathology, University of North Carolina-Chapel Hill, Chapel Hill, North Carolina. (Mentor, Dr. Dana Fowlkes)

August, 1983- July, 1988

NIH Cellular and Molecular Biology Trainee, Institute for Molecular Virology, St. Louis University, St. Louis, Missouri.
(Mentor, Dr. Duane P. Grandgenett)

May, 1982- August, 1983

Undergraduate Research Assistant, Department of Microbiology and Immunology, Washington University, St. Louis, Missouri.
(Mentor, Dr. David Apirion)

Honors, Awards and Service

- 1988-1991 National Institutes of Health Postdoctoral Fellow, Duke University, Durham, NC.
- 1996 Honor Society of Agriculture Sigma Delta Teaching Award of Merit
- 1996 North Carolina Biotechnology Center: Grant Reviewer
- 1997 US Department of Energy Study Section
- 1998 NIH Study Section (ad hoc reviewer)
- 2000 US Department of Energy Study Section
- 2002 US Department of Energy, Imaging Gene Expression II.
- 2002 Department of Energy Study Section
- 2003 California Breast Cancer Research Program (ad hoc reviewer)

Profession Societies

American Chemical Society, Nuclear Sciences Division
American Society of Biochemists and Molecular Biologists
Society of Nuclear Medicine
Society of Radiopharmaceutical Chemistry & Biology
American Association of Cancer Researchers

Publications

1. Dallman, G., Quinn, T., and Apirion, D. 1983. "A Gene Affecting Accumulation of the RNA Moiety of the Processing Enzyme RNase P," J. Bacteriol. 156, 529-536.
2. Grandgenett, D. P., Quinn, T., Hippenmeyer, P. J. and Oroslan, S. 1985. "Structural Characterization of the Avian Retrovirus Reverse Transcriptase and Endonuclease Domains," J. Biol. Chem. 260, 8243-8249.
3. Quinn, T. and Grandgenett, D. P. 1988. "Genetic Evidence that the Avian Retrovirus DNA Endonuclease Domain of pol is Necessary for Viral Integration," J. Virol. 62, 2307-2312.
4. Lin, T.-H., Quinn, T., Grandgenett, D. P., and Walsh, M. T. 1989. "Secondary Structural Analysis of the Avian Myeloblastosis Virus Integrase: Characterization by Circular Dichroism and Empirical Prediction Methods," Proteins: Structure, Function and Genetics 5, 156-165.

5. Quinn, T. and Grandgenett, D. P. 1989. "Avian Retrovirus Integration Protein: Structure - Functional Analysis of Viable Mutants," *Virology* 173, 478-488.
6. Olsen, J.C., Bova-Hill, C., Grandgenett, D.P., Quinn, T.P., Manfredi, J.P., and Swanstrom, R. 1990. "Rearrangements in Unintegrated Retroviral DNA are Complex and are the result of Multiple Genetic Determinants", *J.Virol.* 64, 5475-5484.
7. Lin, T-H., Quinn, T., Walsh, M. T., Grandgenett, D. P., and Lee, J. C. 1991 "Avian Myeloblastosis Virus Reverse Transcriptase: Effect of Glycerol on its Hydrodynamic Properties", *J. Biol. Chem.* 266, 1635-1640.
8. Richardson, J.S., and Richardson, D.C., Tweedy, N.B., Gernert, K.M., Quinn, T.P., Hecht, M.H., Erickson, B.W., Yan, Y., McClain, R.D., Donlan, M.E., and Surles, M.C. 1992. "Looking at Proteins: Representations, Folding, Packing and Design", *Biophys. J.*, 63, 1886-1209.
9. Calcutt, M.J., Kremer, M.T., Giblin, M.F., Quinn, T.P., and Deutscher, S.L. 1993 "Isolation and Characterization of Nucleic-Acid Binding Antibody Fragments from Autoimmune Mice-Derived Bacteriophage Display Libraries", *Gene* 137, 77-83.
10. Zhang, M., Quinn, T.P., and Wong, T.C. 1994 "Solution Conformation of a Cyclic Neurokinin Antagonist. A Nuclear Magnetic Resonance and Molecular Dynamics Study", *Biopolymers* 34, 1165-1173.
11. Quinn, T.P., Tweedy, N.B., Williams, R.W., Richardson, J.S., and Richardson, D.C. 1994, "Betadoublet: *De novo* Design, Synthesis and Characterization of a Novel β Sandwich Protein", *Proc. Natl. Acad. Sci. USA* 91, 8747-8751.
12. Erb, L., Garrad, R., Wang, Y., Quinn, T., Turner, J.T., and Weisman, G.A. 1995 "Site-directed Mutagenesis of the P2U Nucleotide Receptor," *J. Biol. Chem.* 270, 4185-4188.
13. Tipton, P.A., Quinn, T.P., Reisach, J. and Cook, P.F. 1996 "Role of the divalent metal ion in the NAD:malic enzyme reaction: An ESEEM determination of the ground state conformation of malate in the E:Mn:malate complex," *Protein Science* 5, 1648-1654.
14. Deutscher, S.L., Crider, M.E., Ringbauer, J., Komissarov, A.A., and Quinn, T.P. 1996 "Stability studies of nucleic acid-binding Fab isolated from combinatorial bacteriophage display libraries," *Ach. Biochem. Biophys.* 333, 207-213.
15. Petrenko, V.A. Smith, G.P., Gong, X. and Quinn, T.P. 1996 "A library of organic landscapes on filamentous phage," *Protein Engineering* 9, 797-801.
16. Peletskaya, E.N., Glinsky, G., Deutscher, S.L., and Quinn, T.P. 1996 "Identification of peptide sequences that bind the Thompson-Freidenreich cancer-associated glycoantigen from Bacteriophage peptide display libraries," *Molecular Diversity* 2, 13-18.

17. Samudzi, C., Schroeder, S., Griffith, S., Chen, X., and Quinn, T. P. 1997. "Crystallization and Preliminary Studies of Lima Bean Trypsin Inhibitor", *Proteins* 27, 311-314.
18. Giblin, M. F., Jurisson, S. S., and Quinn, T. P. 1997. "Synthesis and Characterization of Rhenium-Complexed Alpha-Melanotropin Analogs", *Bioconjugate Chemistry* 8, 347-353.
19. Peletskaya, E., Glinsky, V., Glinsky, G. G., Deutscher, S. L., and Quinn, T. P. 1997. "Characterization of Peptides that Bind the Tumor-Associated Thomsen-Friedenreich Antigen Selected from Bacteriophage Display Libraries." *J. Mol. Biol.* 270, 374-384.
20. Hale, C.C., Bliler, S., Quinn, T. P., and Peletskaya, E. N. 1997. "Localization of an Exchange Inhibitory Peptide (XIP) Binding Site on the Cardiac Sodium-Calcium Exchanger." *Biochem. Biophys. Res. Comm.* 236, 113-117.
21. Komissarov, A. A., Calcutt, M. J., Quinn, T. P., and Deutscher, S. L. 1997. "Site specific mutagenesis of a recombinant anti-single-stranded DNA Fab." *J. Biol. Chem.* 272, 26864-26870.
22. Giblin, M.F., Wang, N., Hoffman, T.J., Jurisson, S.S., and Quinn, T. P. 1998. "Design and Characterization of Alpha-Melanotropin Peptide Analogs Cyclized Through Rhenium Metal Coordination." *Proc. Natl. Acad. Sci. USA* 95, 12418-12818.
23. Karasseva, N., Wang, N., Jurisson, S. S., Quinn, T. P., and Deutscher, S. L. 1999 "Labeling genetically engineered antibody fragments with Tc-99m and Re-186/188." *In: Technetium, Rhenium and other metals in chemistry and nuclear medicine*, Eds Nicolini and Mazzi, Servizi Grafici Eitoriali, Padova, Italy; pp549-552.
24. Chen, J. Q., Wang, N., Jurisson, S. S., and Quinn, T.P. 1999. "Biodistribution properties of linear and cyclic Tc-99m labeled alpha-melanotropin peptides." *In: Technetium, Rhenium and other metals in chemistry and nuclear medicine*, Eds Nicolini and Mazzi, Servizi Grafici Eitoriali, Padova, Italy; pp 457-463.
25. Chen, J.Q., Giblin, M.F., Wang, N., Jurisson, S.S. and Quinn, T.P. 1999. "In vivo evaluation of $^{99m}\text{Tc}/^{188}\text{Re}$ -labeled linear alpha-melanocyte stimulating hormone analogs for specific melanoma targeting." *Nucl. Med. Biol.* 26, 687-693.
26. Glinsky, V.V., Huflejt, M.E., Deutscher, S.L., and Quinn, T.P. 2000. "Effects of Thomsen-Friedenreich antigen-specific peptide P-30 on β -galactoside mediated homotypic aggregation and adhesion to the endothelium of MDA-MB-435 human breast carcinoma cells." *Cancer Research* 60, 2584-2588.
27. Chen, J. Q., Cheng, Z., Hoffman, T.J., Jurisson, S.S., and Quinn, T.P. 2000. "Melanoma-Targeting Properties of ^{99m}Tc -Labeled Cyclic α -Melanocyte Stimulating Hormone Peptide Analogues." *Cancer Research* 60, 5649-5658.

28. Glinsky, V.V., Glinsky, G.V., Rittenhouse-Olson, K., Huflejt, M.E., Glinskii, O.V., Deutscher, S.L. and Quinn, T.P. (2001). "The Role of Thomsen-Friedenreich Antigen in Adhesion of Human Breast and Prostate Cancer Cells to the Endothelium." *Cancer Research* 61, 4851-4857.
29. Hoffman, T.J., Quinn, T.P., and Volkert, W.A. (2001) "Radiometallated receptor-avid peptide conjugates for specific in vivo targeting of cancer cells." *Nucl. Med. Biol.* 28, 537-539.
30. Chen, J-Q., Cheng, Z., Owen, N.K., Hoffman, T.J., Miao, Y., Jurisson, S.S., and Quinn, T.P. (2001) "Evaluation of an ¹¹¹In-DOTA-Rhenium Cyclized α -MSH Analog: A Novel Cyclic-Peptide Analog with Improved Tumor Targeting Properties." *J. Nucl. Med.* 42, 1847-1855.
31. Chen, J. Q., Cheng, Z., Miao, Y., Jurisson, S.S., and Quinn, T.P. (2002) "^{99m}Tc- and ¹¹¹In-labeled α -MSH Peptide Analogs for Malignant Melanoma Targeting." *Cancer* 94, 1196-1201.
32. Cheng, Z., Chen, J., Owen, N., Miao, Y., Quinn, T.P., and Jurisson, S.S. (2002) "Modification of the structure of a metalloprotein: Synthesis and biological evaluation of ¹¹¹In labeled DOTA conjugated rhenium cyclized α -MSH analogs. *J. Med. Chem.* 45, 3048-3056.
33. Karashev, N.G., Glinsky, V.V., Chen, N.X., Komatireddy, R. and Quinn, T.P. (2002) "Identification and Characterization of Peptides that Bind Human ErbB-2 Selected from a Bacteriophage Display Library." *J. Prot. Chem.* 21, 287-296.
34. Miao, Y., Owen, N.K., Whitener, D., Gallazzi, F., Hoffman, T.J. and Quinn, T.P. (2002) "In Vivo Evaluation of ¹⁸⁸Re Labeled Alpha-Melanocyte Stimulating Hormone Peptide Analogs for Melanoma Therapy." *Int. J. Cancer* 101, 480-487.
35. Miao, Y., Owen, N.K., and Quinn, T.P. (2002). "Therapeutic efficacy of ¹⁸⁸Re labeled (Arg¹¹)CCMSH peptide in a murine melanoma bearing mouse model." In: *Technetium, Rhenium and other metals in Chemistry and Nuclear Medicine-6*, Eds Nicolini and Mazzi, Servizi Grafici Eitoriali, Padova, Italy; pp 375-380.
36. Miao, Y., Owen, N.K., Whitener, D., Gallazzi, F., Hoffman, T.J. and Quinn, T.P. (2002) "Optimizing the tumor to kidney uptake ratios of ¹⁸⁸Re labeled α -MSH peptide analogs through chemical modification." In: *Technetium, Rhenium and other metals in Chemistry and Nuclear Medicine-6*, Eds Nicolini and Mazzi, Servizi Grafici Eitoriali, Padova, Italy; pp 567-570.
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**DECLARATION OF JOHN F. KAUFFMAN RELATING TO DISCLOSURE OF
DISSERTATION OF NING LI, Ph.D.**

Assistant Commissioner of Patents
United States Patent and Trademark Office
Washington, D.C. 20231
Re: Application of Hoffman et al. (Serial No. 09/064,499 and related applications)

I, John F. Kauffman, do hereby declare the following:

1. I am an Associate Professor of Chemistry at the University of Missouri-Columbia. My address is 508 Westmount Avenue, Columbia, Missouri 65203. I have been a professorially-ranked employee of the University of Missouri since 1991. A copy of my professional resume is attached.

2. I was present at NING LI's Doctoral Dissertation defense and served on the Dissertation committee, for the Doctoral Dissertation titled "Synthesis and Characterization of ¹⁰⁵Rh-Labeled Thiamacrocycles for Use to Formulate Peptide Receptor Agents", which was prepared and presented in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

3. I have been requested to prepare and execute the present Declaration to memorialize my current recollection as to the manner in which the oral Dissertation defense and written text of the Doctoral Dissertation of NING LI were handled until immediately after April 22, 1997, i.e., the filing date of U.S. Provisional Application 60/044,409.

4. I was present at the Doctoral Dissertation defense of NING LI on July 24, 1996. The following persons, who served on the Dissertation committee were also present: Dr. Wynn A. Volkert, Professor of Radiological Sciences and Biochemistry; Dr. Thomas P. Quinn, Associate Professor of Biochemistry; Dr. Silvia S. Jurisson, Professor of Chemistry; and Dr. Kattesh V. Katti, Professor of Radiology. To the best of my current recollection, we were the only persons present during the Dissertation defense.

**DECLARATION JOHN F. KAUFFMAN RELATING TO DISCLOSURE OF DISSERTATION
OF NING LI, Ph.D.**

5. The Doctoral Dissertation defense of NING LI was not open to the general public.
6. To the best of my current recollection, I received a copy of NING LI's Doctoral Dissertation prior to the Dissertation defense and I did not disclose the information contained therein or discussed during the defense, to third parties.
7. I did not reveal the details of the oral presentation and written text of the Doctoral Dissertation defense of NING LI to any third parties outside the University of Missouri who did not have an obligation of confidentiality.
8. I am not aware of any copies of the Doctoral Dissertation which were provided to anyone other than the following persons, who were the members of the Dissertation committee: Volkert, Jurisson, Quinn, Kauffman, Katti (as described in ¶4). To my recollection these copies were collected by NING LI at the end of the Dissertation defense. I did not retain a copy of the text of the Dissertation after the defense.
9. To the best of my knowledge, the details of the oral Dissertation defense and written text of the Doctoral Dissertation—beyond the details disclosed in the Abstract entitled, "In-Vitro and In-Vivo Characterization of a Rh-105-Tetrathiamacrocycle Conjugate of a Bombesin Analogue," appearing in the Journal of Nuclear Medicine, Vol. 37, No. 5, May 1996 Supplement—were not disclosed to any third parties outside the University of Missouri who did not have an obligation of confidentiality until after April 22, 1997, the filing date of U.S. Provisional Patent Application No. 60/044,409.
10. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

9/10/03

Date

John F. Kauffman
John F. Kauffman

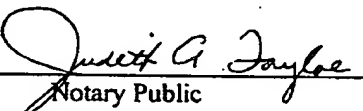
DECLARATION JOHN F. KAUFFMAN RELATING TO DISCLOSURE OF DISSERTATION
OF NING LI, Ph.D.

COUNTY OF Boone)
)
STATE OF MISSOURI) ss:
)
UNITED STATES OF AMERICA)

On this 10th day of September, 2003, before me, a Notary Public, personally appeared John F. Kauffman to me known to be a person described in and who executed the foregoing Declaration and acknowledged that he executed same as his free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal the date and year last above written.

JUDITH A. TAYLOE
Notary Public - Notary Seal
STATE OF MISSOURI
Howard County
My Commission Expires: Jan 22, 2006


Notary Public

My Commission Expires: 1/22/06

(SEAL)

20. "Simple and Accurate Method to Determine the Molecular Hyperpolarizability by Relative EFISH Measurements", ChangSheng Liu, John F. Kauffman, Grace S. Chen, and Rainer Glaser, The National Meeting of the American Chemical Society New Orleans, LA, March 23-27, 1996
19. "Dependence of GaAs Photoluminescence Efficiency on Excitation Power and Applied Potential", ChangSheng Liu and John F. Kauffman, The National Meeting of the American Chemical Society New Orleans, LA, March 23-27, 1996
18. "Trans-cis Photoisomerization kinetics of diphenylpolyenes in the compressible region of supercritical fluids", John F. Kauffman, Robert M. Anderton, Richard D. Schulte, and Kathy Wiemers, The National Meeting of the American Chemical Society New Orleans, LA, March 23-27, 1996
- *17. "Structure-Function Relationships for Solvent Density Augmentation via Solute Rotational Relaxation in Supercritical Fluids" John F. Kauffman, Robert M. Anderton, Richard D. Schulte, and Kathy Wiemers, The Pittsburgh Conference Chicago, IL, March 3-7, 1996, (Invited Lecture)
16. "Rotational Relaxation and Kinetics of Diphenylpolyenes in the Compressible Region of CO₂" John F. Kauffman, Robert M. Anderton, and Kathy Wiemers, Symposium on Molecular Reaction Dynamics in Condensed Media, Newport Beach, CA, February 7-10, 1996
15. "Picosecond Laser Excited Photoluminescence Efficiency Measurements as a Probe of Surface Recombination in n-GaAs" John F. Kauffman and ChangSheng Liu, Annual Meeting of the F.A.C.S.S., St. Louis, MO, October 2-7, 1994
14. "Effect of Solvent Permittivity on Diphenylbutadiene Photoisomerization in n-Alcohols" Robert M. Anderton and John F. Kauffman, 206th National Meeting of the American Chemical Society, Washington D. C., August 22, 1994
13. "Characterization of GaAs Using Picosecond Laser Excited Luminescence" John F. Kauffman, ChangSheng Liu, and Maurice W. Karl, 185th Meeting of the Electrochemical Society, San Francisco, CA, May 22-27, 1994
12. "Excitation Power Dependence of Photoluminescence from Surface Treated GaAs" ChangSheng Liu and John F. Kauffman, Midwest Regional Meeting of the American Chemical Society, Columbia, MO, November 10-12, 1993
11. "Reorientation of Large Aromatic Molecules in Mixed Supercritical Fluids" Robert M. Anderton and John F. Kauffman, Midwest Regional Meeting of the American Chemical Society, Columbia, MO, November 10-12, 1993
10. "Fluorescence Spectra and Decays of bis(4-Aminophenyl)sulfone and Derivatives as Probes of Solvent-Solute Interactions in Supercritical Fluids" Richard D. Schulte, Robert M. Anderton, and John F. Kauffman, Midwest Regional Meeting of the American Chemical Society, Columbia, MO, November 10-12, 1993
9. "Arrhenius Parameters for the Photoisomerization of Diphenylbutadiene in Mixed Supercritical Fluids" John F. Kauffman and R. M. Anderton, Midwest Regional Meeting of the American Chemical Society, Columbia, MO, November 10-12, 1993
8. "Picosecond Laser Excited Luminescence as a Probe of Surface Recombination in GaAs" John F. Kauffman and ChangSheng Liu, Annual Meeting of the F.A.C.S.S., Detroit, MI, October 17-22, 1993
7. "Passivation of GaAs by C₃S₅²⁻" ChangSheng Liu and John F. Kauffman, National Meeting of the American Chemical Society, Chicago, IL, August 22-27, 1993
6. "Diphenylbutadiene Isomerization in Mixed Supercritical Fluids" Robert, M. Anderton, Richard D. Schulte, and John F. Kauffman, National Meeting of the American Chemical Society, Chicago, IL, August 22-27, 1993
5. "Fluorescence Spectra and Decays of bis(4-Aminophenyl)sulfone as a Probe of Solvent-Solute Interactions in Supercritical Fluids" Richard D. Schulte, Robert, M. Anderton, and John F. Kauffman, National Meeting of the American Chemical Society, Chicago, IL, August 22-27, 1993
4. "Diphenylbutadiene Isomerization in Mixed Supercritical Fluids" John F. Kauffman, Robert M. Anderton and Richard D. Schulte, 205th ACS National Meeting, Denver, CO, March 28, 1993
3. "Excited State Isomerization in the Supercritical Fluid Environment", John F. Kauffman, Robert M. Anderton, ChangSheng Liu and Richard D. Schulte, Midwest Regional Meeting of the American Chemical Society, Lawrence, KS, November 4-6, 1992
2. "Time Resolved Luminescence from Photochemically Treated GaAs", Meeting of the Electrochemical Society, October, 1990, Seattle WA
1. "Time Resolved Studies of IVR in the Excited Electronic State of Fluorene", Western Spectroscopy Association Conference, January 1989, Asilomar, CA.

39. "Reaction Kinetics and Quadrupolar Interactions in supercritical CO₂" PacificChem 2000 International Chemical Congress of Pacific Basin Societies, Honolulu, HI, December 14-19, 2000
38. "Analysis of the 1,4-dioxane anomaly using the ADMA [1-(9-anthryl)-3-(4-N,N-dimethylaniline)propane] molecule as a fluorescence probe" M. Khajepour, J.F. Kauffman, International Conference on Photophysics and Photochemistry 2000, Monte-Estori, Portugal, October 16-20, 2000
37. "Analysis of the 1,4-dioxane anomaly using the ADMA (1-(9-anthryl)-3-(4-N,N-dimethylaniline)propane) molecule as a fluorescence probe" Mazdak Khajepour and John F. Kauffman, 200th National Meeting of the American Chemical Society, Washington, D.C., August 20-24, 2000
36. "Preferential solvation of ADMA(1-(9-anthryl)-3-(4-N,N-dimethylaniline)propane) in Hexane-Ethanol and THF-Cyclohexane mixtures" Mazdak Khajepour and John F. Kauffman, 200th National Meeting of the American Chemical Society, Washington, D.C., August 20-24, 2000
- *35. "Quadrupolar solvation in supercritical CO₂ and implications for chemical kinetics" John F. Kauffman and Mazdak Khajepour, 200th National Meeting of the American Chemical Society, Washington, D.C., August 20-24, 2000 (Invited Lecture)
34. "Emission Peak Shifts of a Solute dissolved in Supercritical CO₂ and Other Nondipolar Solvents. Interpreting the observed anomalies in terms of Quadrupole-Dipole Interactions" Mazdak Khajepour and John F. Kauffman, 16th International Conference in Chemical Thermodynamics, International Union of Pure and Applied Chemists, Halifax, Nova Scotia, Canada, August 6-11, 2000
33. "Preferential Solvation of ADMA in Hexane-Ethanol and THF-Cyclohexane Mixtures" Mazdak Khajepour and John F. Kauffman, 16th International Conference in Chemical Thermodynamics, International Union of Pure and Applied Chemists, Halifax, Nova Scotia, Canada, August 6-11, 2000
32. "Studying Preferential Solvation in Ethanol-Hexane Mixtures Using the ADMA molecule as a Fluorescence Probe" Mazdak Khajepour and John F. Kauffman, 11th Inter-American Photochemical Society Meeting, Clearwater, Florida, January 2-6, 2000
31. "Investigating Preferential Solvation in Binary Solvent Mixtures Using 1-(9-anthryl)-3-(4-dimethylaniline) propane (ADMA) as a Probe." J. F. Kauffman, M. Khajepour, Midwest Regional Meeting of the American Chemical Society, Quincy, IL, Oct 28, 1999
30. "Ultrafast Time Resolved Studies of Solvation and Reactivity in Supercritical Fluids", Mazdak H. Khajepour, Jesse Greever, and J. F. Kauffman, National Meeting of the American Chemical Society, Dallas, TX, March 16, 1998
29. "Photoisomerization of Diphenylpolyenes in Supercritical Fluids", Kathy L. Wiemers and J. F. Kauffman, National Meeting of the American Chemical Society, Dallas, TX, March 15, 1998
28. "Rotational Diffusion and Unimolecular Isomerization Kinetics in Supercritical Fluid Solvents", K. L. Wiemers, Mazdak H. Khajepour, Jesse Greever, and J. F. Kauffman, National Meeting of the American Chemical Society, Dallas, TX, March 16, 1998
27. "A Study of the Rotational Correlation Time of Substituted Anthracenes in Liquids and Supercritical Fluids" M. Khajepour and J. F. Kauffman, Midwest Regional Meeting of the American Chemical Society, Lake of the Ozarks, MO, Oct 31, 1997
26. "Photoisomerization of Hydroxymethylstilbene in Liquids and Supercritical Fluids" K. L. Wiemers and J. F. Kauffman, Midwest Regional Meeting of the American Chemical Society, Lake of the Ozarks, MO, Oct 31, 1997
25. "Supercritical Fluid Extraction of Several Perrhenate Ion Pair Complexes" M. F. Reasoner, S. Jurisson, and J. Kauffman, Midwest Regional Meeting of the American Chemical Society, Lake of the Ozarks, MO, Oct 31, 1997
24. "Ultrafast Time Resolved Studies of Solvation and Reactivity in Supercritical Fluids" John F. Kauffman, Mazdak Khajepour, Kathy Wiemers, Jesse Greever, 24th Annual Meeting of the F.A.C.S.S., Providence, RI, October 26, 1997
- *23. "Rotational Diffusion and Trans-cis Isomerization of Substituted Diphenyl Polyenes in the Compressible Region of Supercritical Fluids" John F. Kauffman, Kathy Wiemers, and Mazdak H. Khajepour, 16th Bi-annual Meeting of the International Association for the Advancement of High pressure Science and Technology (AIRAPT), August 26, 1997, Kyoto, Japan (Invited Lecture)
22. "Passivation of GaAs with a Polymerizable, Adhesion Promoting Self Assembled Monolayer", Ting Hou, Maurice W. Karl, and John F. Kauffman, 1997 Annual Meeting of the Electrochemical Society, Montreal, Canada, April 21, 1997
21. "Solute Rotational Diffusion in Supercritical Fluids", John F. Kauffman, Robert M. Anderton, and Kathy Wiemers, 1996 Annual Meeting of the American Institute of Chemical Engineers, Chicago, IL, November 12, 1996

BOOK AND PEER REVIEWS

- Integrated Chemical Systems: A Chemical Approach to Nanotechnology. By Allen J. Bard (University of Texas at Austin). Wiley: New York. 1994. (Appears in the Journal of the American Chemical Society, 117, 3316 (1995))
- Peer reviewer for the following journals: Chemical Physics Letters, Journal of Physical Chemistry, Journal of Chemical Physics, Applied Spectroscopy, Microanalytical Chemistry, Chemical Reviews, Photochemistry and Photobiology
- Peer reviewer for the following funding agencies: National Science Foundation, Petroleum Research Foundation, The Research Corporation, University of Missouri Research Board

INVITED LECTURES

17. "Solvation and Reactivity in Liquid and Supercritical Fluid Solvents", September 30 1999, Kansas State University, Manhattan, KS
16. "Solvent-Solute Interactions and Unimolecular Reaction Kinetics in Liquids and Supercritical Fluids", May 18, 1998, University of Oregon, Eugene
15. "Chemical Reactivity and Rotational Dynamics in Liquids and Supercritical Fluids", April 23, 1998, University of North Carolina, Chapel Hill
14. "Kinetics of Excited State Isomerization in Supercritical Fluid Solvents", University of Nottingham, Nottingham, UK, March 3, 1998
13. "Unimolecular Isomerization and Rotational Diffusion in Polar Liquids and Supercritical Fluids", August 29, 1997, Kyoto University, Kyoto, Japan
12. "Photoluminescence Studies of GaAs: Surface Recombination Kinetics and Novel Surface Passivation Schemes", August 22, 1997, Kyushu University, Fukuoka, Japan
11. "Probing Supercritical Fluid Solvents Using Laser Spectroscopy" Southwest Missouri State University, Springfield, MO, October 28, 1996
10. "Solvation and Reactivity in Polar Liquids and Supercritical Fluids" University of Illinois at Urbana-Champaign, October 16, 1996
9. "Ultrafast Spectroscopy of Supercritical Fluid Solutions: Can we develop structure-activity relationships with regard to local density augmentation?" University of Nevada-Reno, October 21, 1995
8. "Spectroscopic Studies of Supercritical Fluid Solvation" Michigan State University, April 20, 1995
7. "Chemical Reactivity in Supercritical Fluids and Polar Liquids" University of Kansas, October 19, 1994
6. "Spectroscopic Studies of Solvation in Supercritical Fluids" Iowa State University, April 1, 1994
5. "Studying Supercritical Fluid Solvation with Lasers" Wichita State University, April 21, 1993
4. "Picosecond Lasers in Analytical Chemistry: Studying Molecular Fluorescence in Supercritical Fluid Solutions", Fort Hays State University, April 5, 1993
3. "Dynamics of Photoexcited Carriers at the Semiconductor/Electrolyte Interface", Department of Physics, University of Missouri, Columbia, October, 1991
2. "Dynamics of Photogenerated Carriers at the GaAs/Liquid Interface", Chemical Physics Institute, University of Oregon, Eugene, April 1991
1. "Photochemistry at the Semiconductor/Liquid Interface", Department of Chemistry, University of Missouri, Columbia, March, 1991

CONFERENCE PRESENTATIONS (Invited presentations are marked with an *)

- *45. "Static and Dynamic Regimes of Solvent Control of Intramolecular Electron Transfer in 1-(9-anthryl)-3-(4-dimethylaniline)propane, John F. Kauffman, Mazdak Khajepour, Na'il Saleh and Daniel Bassil, International Bunsen Discussion on Dynamics of Molecular Phenomena in Supercritical Fluids, Tutsing, Germany, September 1-5 2003
44. "Photoinitiated, Intramolecular Electron Transfer in 1-(9-anthryl)-3-(4-dimethylaniline)propane: Static and Dynamic Regimes of Solvent Control of Charge Transfer" John F. Kauffman, Mazdak Khajepour, and Na'il Saleh, Gordon Conference on Photochemistry, Mount Holyoke, MA, July 21-25, 2003
- *42. "Solvent Control of Intramolecular Charge Transfer in ADMA" John F. Kauffman, Mazdak Khajepour and Na'il Saleh, 225th National Meeting of the American Chemical Society, New Orleans, LA, March 23-27, 2003 (Invited Lecture)
41. "Analysis of the 1,4-dioxane anomaly using the ADMA (1-(9-anthryl)-3-(4-N,N-dimethylaniline)propane) molecule as a fluorescence probe", Inter-American Photochemical Society, Cordoba-Argentina, May 2001
40. "Investigating the Contribution of the Solvent Quadrupole Moment to the Solvent Reorganization energy", Inter-American Photochemical Society, Cordoba-Argentina, May 2001

17. R.M. Anderton, J.F. Kauffman, *Influence of solvent permittivity on excited state photoisomerization rates of stilbene in n-alcohols*, Chem. Phys. Lett. (1995) 237, 145
16. R.D. Schulte, J.F. Kauffman, *Fluorescence from the twisted intramolecular charge transfer compound bis (4,4'-dimethylaminophenyl)sulfone in ethanol/CO₂: a probe of local solvent composition*, Appl. Spectrosc. (1995) 49, 31
15. J.F. Kauffman, R.C. Hapak, M.T. Henzl, *Interconversion of the CD and EF Sites in Oncomodulin. Influence on the Eu³⁺ 7F₀ to 7F₅ Excitation Spectrum*, Biochem. (1995) 34, 991
14. G.L. Richmond, J.F. Kauffman, B.A. Balko, (1995) In: Hubbard AT (ed) Handbook of Surface Imaging and Visualization. CRC Press, Boca Raton
13. J.F. Kauffman, C.S. Liu, *Simple shutter circuit for protecting microchannel plate photomultipliers from excess light exposure*, Rev. Sci. Instrum. (1994) 65, 261
12. R.M. Anderton, J.F. Kauffman, *Temperature-Dependent Rotational Relaxation of Diphenylbutadiene in n-Alcohols: A Test of the Quasihydrodynamic Free Space Model*, J. Phys. Chem. (1994) 98, 12117
11. R.M. Anderton, J.F. Kauffman, *Photoisomerization Rates of Diphenylbutadiene in n-Alcohols: Dielectric-Dependent Activation Energies Determined via Fits to Kramers Expression*, J. Phys. Chem. (1994) 98, 12125
10. R.D. Schulte, J.F. Kauffman, *Solvation in Mixed Supercritical Fluids: TICT Spectra of Bis(4,4'-aminophenyl) Sulfone in Ethanol/CO₂*, J. Phys. Chem. (1994) 98, 8793
9. J.F. Kauffman, G.L. Richmond, *Dependence of luminescence decays from gallium arsenide/electrolyte contacts on excitation power and applied bias: examination of the modified dead layer model*, J. Appl. Phys. (1993) 73, 1912
8. J.F. Kauffman, B.A. Balko, G.L. Richmond, *Power dependent effects in photoluminescence vs voltage scans of gallium arsenide/electrolyte junctions using picosecond pulse excitation*, J. Phys. Chem. (1992) 96, 6374
7. J.F. Kauffman, B.A. Balko, G.L. Richmond, *Power dependent effects in the luminescence decay of gallium arsenide/electrolyte contacts at the flat band potential*, J. Phys. Chem. (1992) 96, 6371
6. J.F. Kauffman, G.L. Richmond, *Photoluminescence enhancement monitored in real time during photowashing of gallium arsenide*, Appl. Phys. Lett. (1991) 59, 561
5. J.F. Kauffman, G.L. Richmond, *Time Resolved Luminescence from Photochemically Treated GaAs*, J. Electrochem. Soc. (1990) 417C, 137
4. J.F. Kauffman, M.J. Cote, P.G. Smith, J.D. McDonald, *Picosecond fluorescence depletion spectroscopy. II. Intramolecular vibrational relaxation in the excited electronic state of fluorene*, J. Chem. Phys. (1989) 90, 2874
3. M.J. Cote, J.F. Kauffman, P.G. Smith, J.D. McDonald, *Picosecond fluorescence depletion spectroscopy. I. Theory and apparatus*, J. Chem. Phys. (1989) 90, 2865
2. J.F. Kauffman, M.J. Cote, P.G. Smith, J.D. McDonald, *Novel circuit for phase locking nvo mode-locked lasers*, Rev. Sci. Instrum. (1989) 60, 281
1. J.R. Hill, M.J. Cote, D.D. Dlott, J.F. Kauffman, J.D. McDonald, P.J. Steinbach, J.R. Berendzen, H. Frauenfelder, *Chemical reaction in a glassy matrix: dynamics of ligand binding to protoheme in glycerol: water*, Springer Ser. Chem. Phys. (1986) 46, 43

PUBLICATIONS

In Review

40. John F. Kauffman, Mazdak Khajepour and Na'il Saleh, *Solvent Dependent Activation Barrier for Exciplex Formation in a Tethered Donor-Acceptor Pair. The Influence of Solvent Polarity is Well Characterized by Marcus Theory*, Journal of Physical Chemistry (2003) submitted June 25.

Published

39. Jesse S. Greever, Joseph B M. Turner, and John F. Kauffman, *Femtosecond Resonance Enhanced Multiphoton Ionization of Perylene in Hexane. Electronic Excitation of the Radical Cation and Evidence of Hydrogen Abstraction from the Solvent*, Journal of Physical Chemistry A (2003) 107, 4072
38. Mazdak Khajepour and John F. Kauffman, *Charge Transfer Kinetics and Solvatochromism of 1-(9-Anthryl)-3-(4-dimethylaniline) Propane in 1,4-Dioxane: Nonideal Quadrupolar Charge Distribution and the Origin of the Dioxane Anomaly*, The Journal of Physical Chemistry A (2001) 105, 10316
37. Jesse S. Greever, Joseph B M. Turner, and John F. Kauffman, *Multiphoton Excited Conductance Spectroscopy. I. Application of the Born Model to Femtosecond Laser Excited Multiphoton Ionization of Nonpolar Liquids*, The Journal of Physical Chemistry A (2001) 105, 8635-8641
36. Mazdak Khajepour, Carrie M. Welch, Keith A. Kleiner, John F. Kauffman, *Separation of Dielectric Non-ideality from Preferential Solvation in Binary Solvent Systems: An Experimental Examination of the Relationship Between Solvatochromism and Local Solvent Composition around a Dipolar Solute*, J. Phys. Chem. A (2001) 105, 5372
35. J.A. Gavenis, J.F. Kauffman, S.S. Jurisson, *Ion-Pairing as a Strategy for Extraction by Modified Supercritical Carbon Dioxide: Extraction of Radioactive Metal Ions*, Anal. Chem. (2001) 73, 2022
34. J.F. Kauffman, *Quadrupolar Solvent Effects on Solvation and Reactivity of Solutes Dissolved in Supercritical CO₂*, J. Phys. Chem. A (2001) 105, 3433
33. K.L. Wiemers, J.F. Kauffman, *Excited State Isomerization Kinetics of 4-(Methanol)Stilbene: Application of the Isodielectric Kramers-Hubbard Analysis*, Journal of Physical Chemistry A (2001) 105, 823
32. K.L. Wiemers, J.F. Kauffman, *Dielectric Friction and Rotational Diffusion of Hydrogen Bonding Solutes*, J. Phys. Chem. A (2000) 104, 451
31. M. Khajepour, J.F. Kauffman, *Dielectric Enrichment of 1-(9-Anthryl)-3-(4-N,N-dimethylaniline) Propane in Hexane-Ethanol Mixtures*, Journal of Physical Chemistry A (2000) 104, 7151
30. M. Khajepour, J.F. Kauffman, *Emission Peak Shifts of a Dipolar Solute Dissolved in Non-Dipolar Solvents: A Quantitative Measure of Quadrupole-Dipole Interactions in Supercritical CO₂*, J. Phys. Chem. A (2000) 104, 9512
29. C. Liu, J.F. Kauffman, *Photoluminescence and interfacial heat transfer in gallium arsenide*, Appl. Phys. Lett. (1999) 75, 1434
28. J.F. Kauffman, K. Wiemers, M. Khajepour, *Rotational Diffusion and Trans-Cis Isomerization of Substituted Diphenyl Polyenes in the Compressible Region of Supercritical Fluids*, Rev. High Pres. Sci. Tech. (1998) 7, 1225
27. M. Khajepour, J.F. Kauffman, *Chain Relaxation Kinetics in the Intramolecular Charge Transfer Reaction of 1-(9-anthryl)-3-(4-dimethylaniline)propane in Supercritical CO₂: Bulk Solvent Properties Characterize Reactivity*, Chem. Phys. Lett. (1998) 297, 141
26. J.F. Kauffman, C. Liu, M.W. Karl, *Surface Recombination Kinetics at the GaAs/Electrolyte Interface via Photoluminescence Efficiency Measurements*, J. Phys. Chem. (1998) 102B, 6766
25. T. Hou, C.M. Greenlief, S.W. Keller, L. Nelen, J.F. Kauffman, *Passivation of GaAs (100) with an Adhesion Promoting Self Assembled Monolayer*, Chem. Mater. (1997) 9, 3181
24. C. Liu, R. Glaser, P. Sharp, J.F. Kauffman, *The Slope Ratio Method: A Simple and Accurate Method to Extract the First Hyperpolarizability from EFISH Measurements*, J. Phys. Chem. (1997) 101, 7176
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JOHN F. KAUFFMAN

Department of Chemistry
University of Missouri-Columbia
123 Chemistry Bldg.
Columbia, MO 65211
(573) 882-2547

EDUCATION

Ph.D., Physical Chemistry, University of Illinois, Urbana-Champaign, September 1988

B.S., Chemistry, University of Oregon, Eugene, May 1983

RESEARCH INTERESTS

Femtosecond Laser Applications, Femtosecond Laser Materials Processing, Ultrafast Laser Spectroscopy, Chemical Reactivity in Supercritical Fluids, Solvent Minimization Using Supercritical Fluid Solvents, Supercritical Extraction of Ionic Species from Aqueous Streams, Chemical Sensors Utilizing Semiconductors

PROFESSIONAL EXPERIENCE

1997-present	Associate Professor of Chemistry, University of Missouri, Columbia
1991-1997	Assistant Professor of Chemistry, University of Missouri, Columbia
1988-91	Postdoctoral Research Associate, University of Oregon, Eugene
1983-88	Research and Teaching Assistant, University of Illinois, Urbana
1983	Summer Intern, Monsanto Co., St. Louis, MO
1981-83	Laboratory Assistant, University of Oregon, Eugene

PROFESSIONAL ACTIVITIES

- Co-organizer, Symposium on Solvation, Structure and Reactivity in Supercritical Fluids, PacifiChem 2000 International Chemical Congress of Pacific Basin Societies, Honolulu, HI, December 14-19, 2000
- Co-organizer, Symposium on Dynamics and Structure of Supercritical Fluids, 1998 National Meeting of the American Chemical Society, Dallas, TX, March 29-April 2, 1998
- Organizer, Symposium on Surface Modification of Electronic Materials, F.A.C.S.S. Annual National Meeting, St. Louis, MO, Oct. 2-7, 1994
- Organizer, Symposium on Lasers in Analytical Chemistry, Midwest Regional Meeting of the American Chemical Society, Columbia, MO, Nov. 10-12, 1993
- Secretary-Treasurer, University of Missouri Local Section, American Chemical Society, 1994
- Member, American Chemical Society
- Member, Electrochemical Society

AWARDS

2001	University of Missouri Gold Chalk Award for Outstanding Graduate Mentorship
1997	University of Missouri Faculty International Travel Award
1995	University of Missouri Summer Research Fellowship
1992	Oak Ridge Associated Universities Young Faculty Enhancement Award
1992	University of Missouri Summer Research Fellow
1982	University of Oregon Culbertson Scholarship